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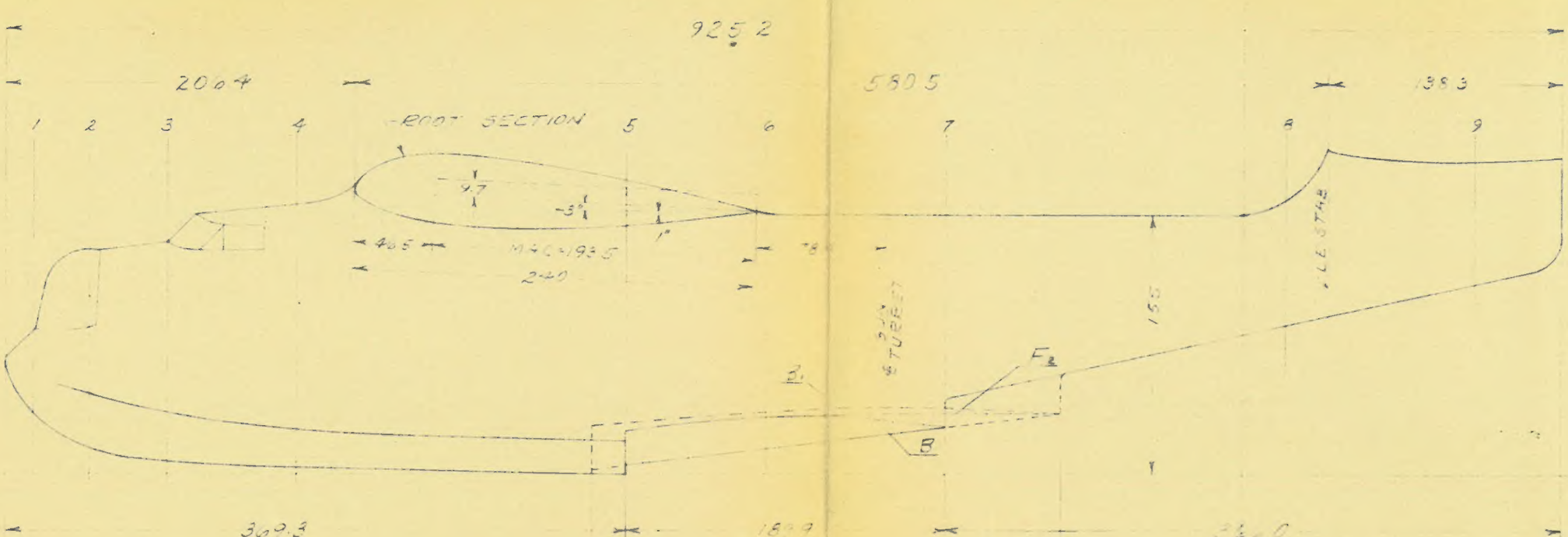
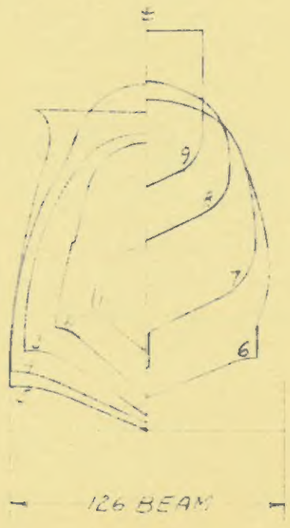
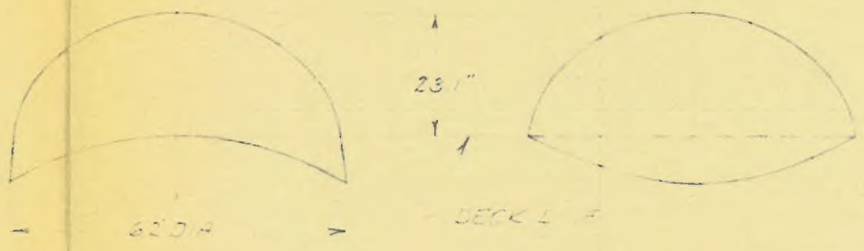
DWG 4





HULL
1/10 ACTUAL SIZE REF. DWG. 29.2020
FRONTAL AREA = 118.37 FT.
SIDE AREA (BELOW WING & STAB.) = 752 SQ. FT.



RUN TURRET M
1/10 ACTUAL SIZE REF DWG. 29.2042
FRONTAL AREA = 1.57 FT.
SIDE AREA (ABOVE DECK LINE) = 7.24 SQ. FT.

HULLS B, B_1, FAIRING F_2, AND TURRET M

7-17-33
H.B.M.

GALCIT RER 221

2-45
FIG 41

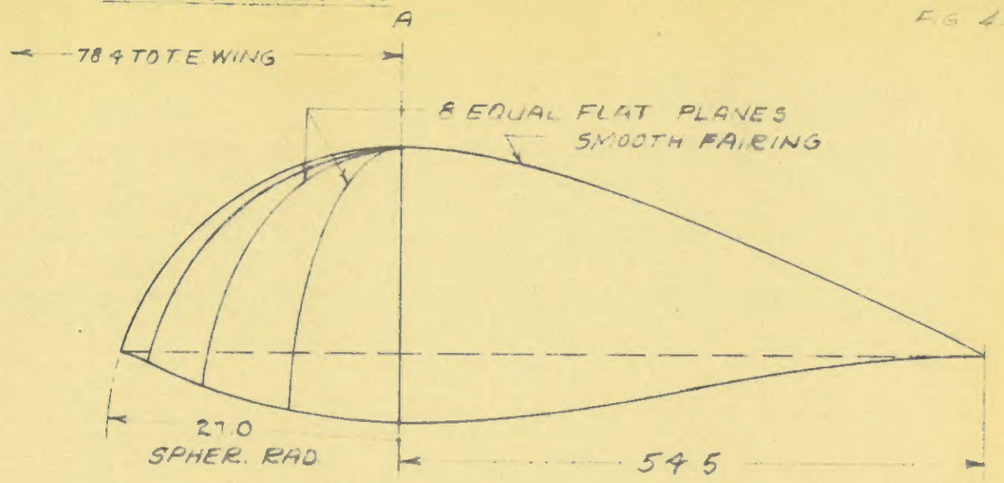


FIG. 1

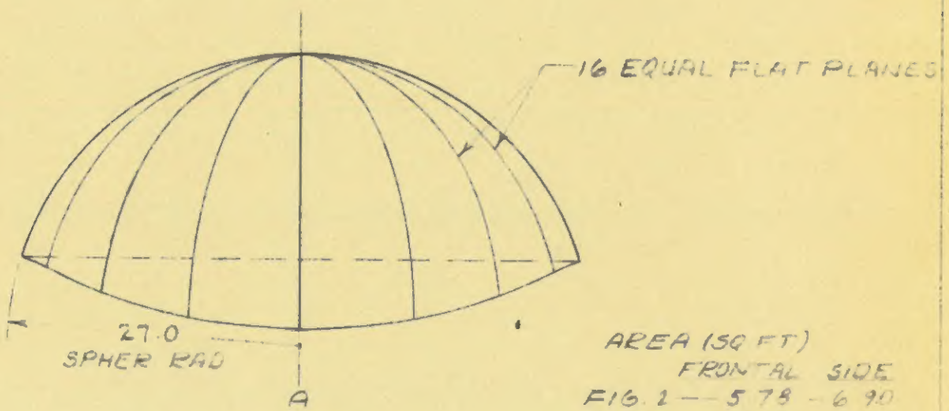
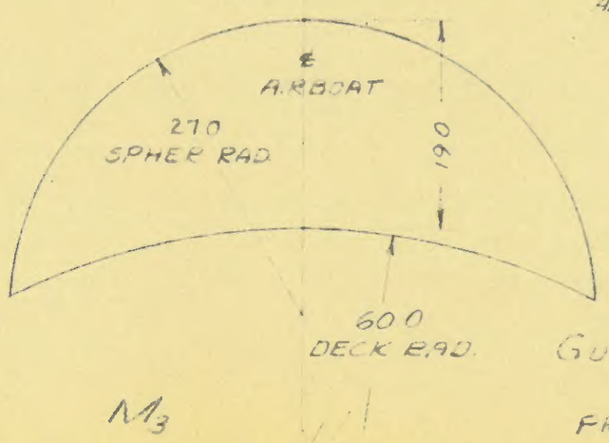


FIG. 2

AREA (SQ FT)

	FRONTAL	SIDE
FIG. 2 —	5 78	- 6 90
FIG 2 —	5 78	- 5 03

SIDE AREA TAKEN ABOVE DECK LINE

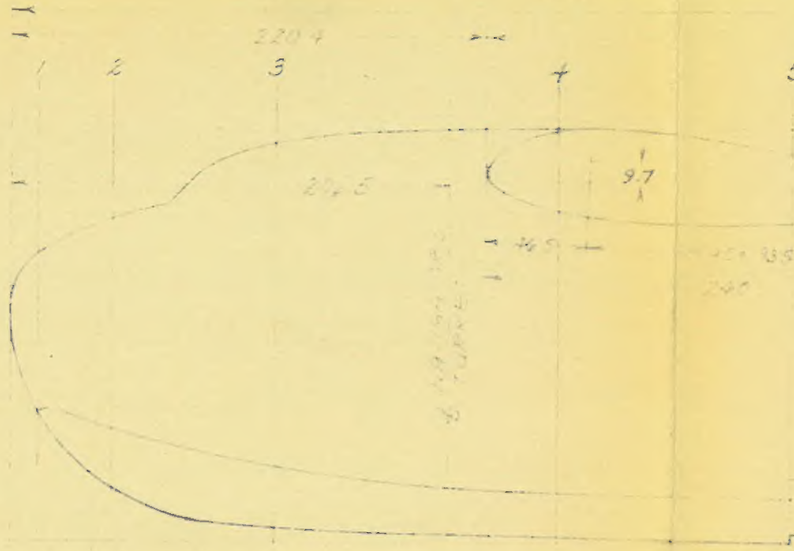


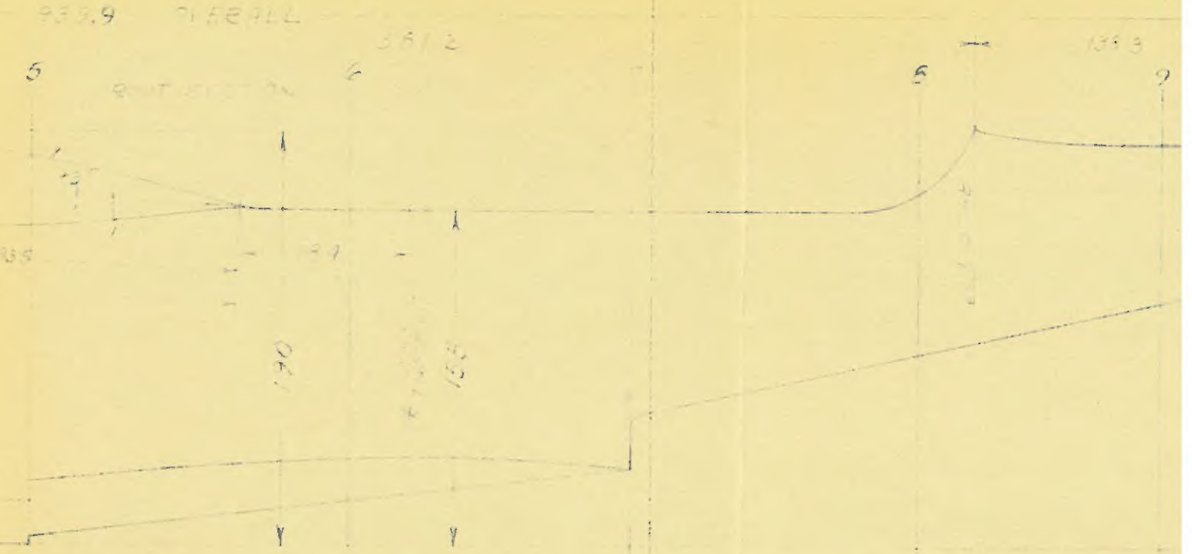
M_3

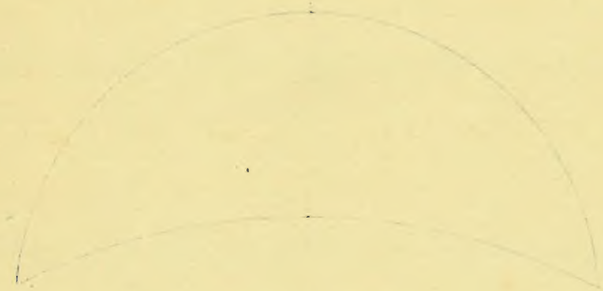
SEC. AA

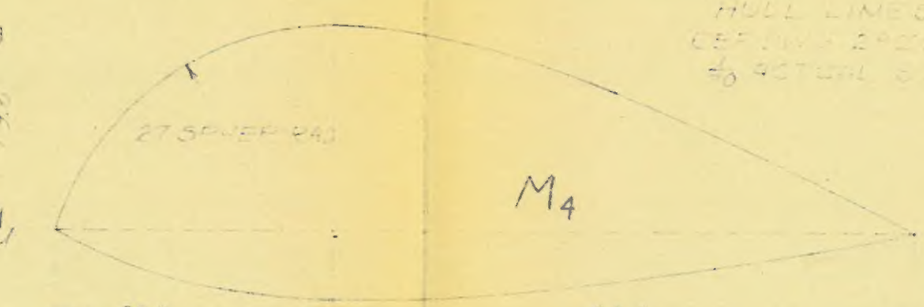
XPB2Y-1
GUN TURRET M_3
PROPOSED
PRODUCTION MODEL

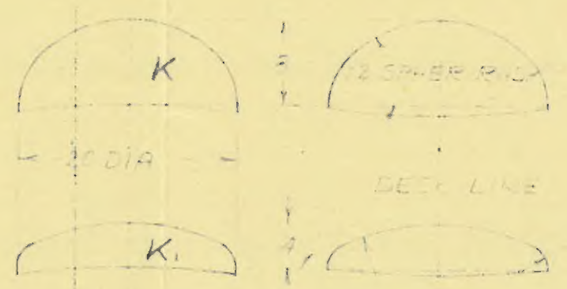
REF DWG. 29Z043
SCALE 1"=1'4" LEM 10-3

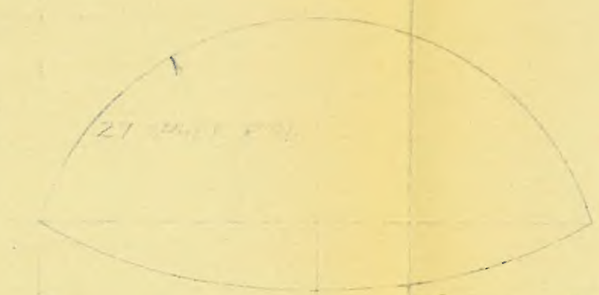












HULL B_2 AND TURRETS K AND M_4

FORM NO. 194 FRYE & SMITH

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CONSOLIDATED AIRCRAFT CORPORATION

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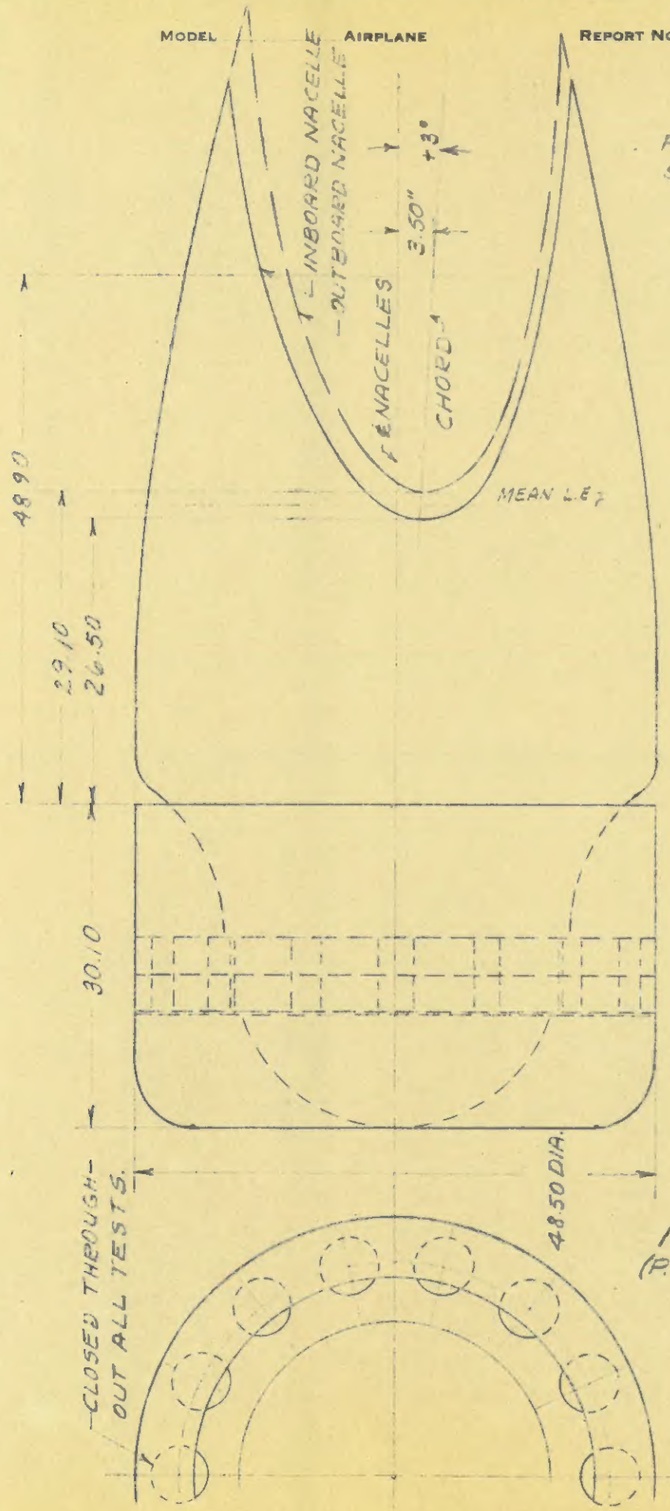
FIG 6

MODEL _____ AIRPLANE _____ REPORT NO. _____



FRONTAL AREA = 12.8 SQ FT
SIDE AREA (FWD OF MEAN LEADING EDGE = 19.2 SQ FT

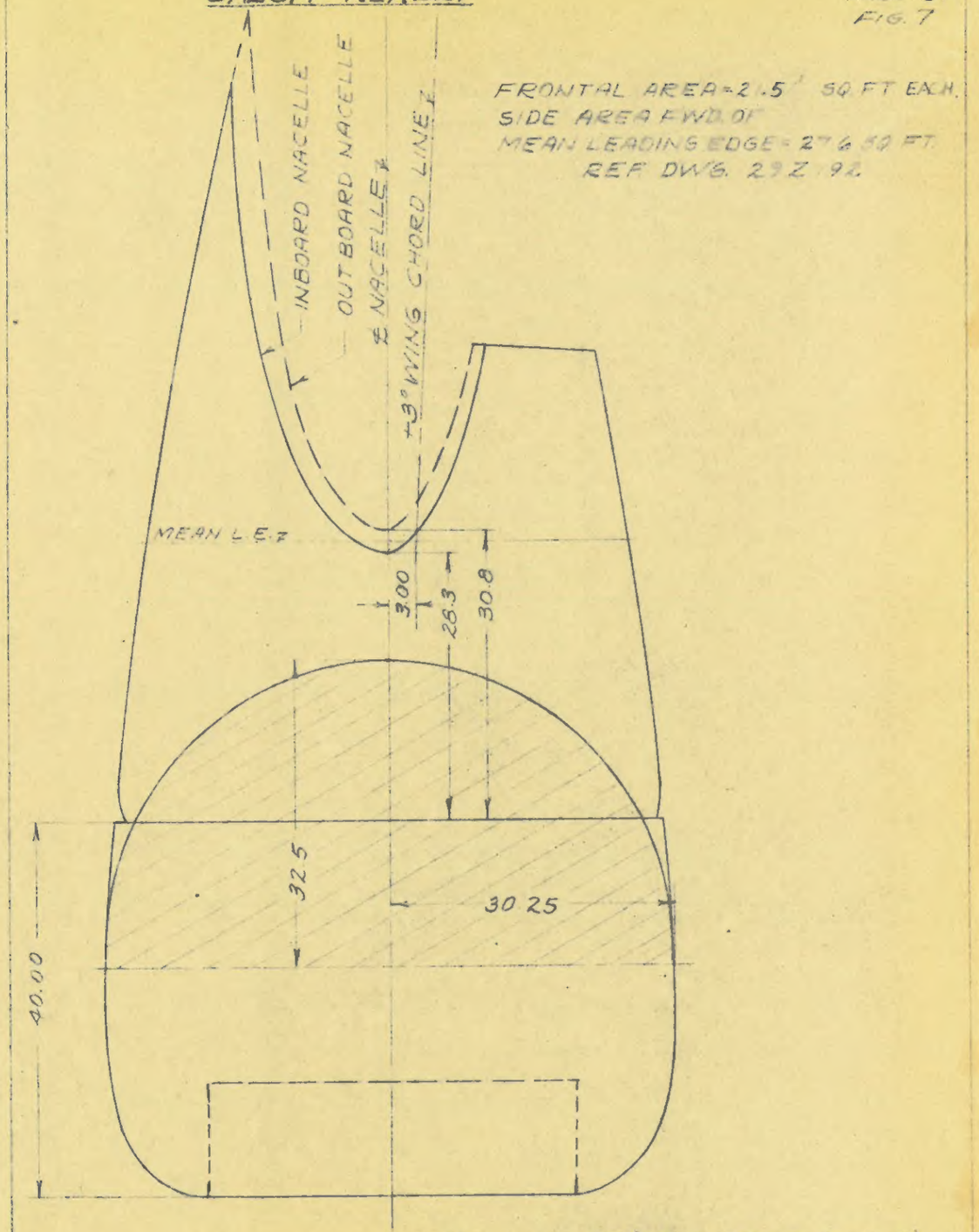
REF. DWG. 29Z033

XPB2Y-1
NACELLES N AND Nc
(P. & W. R-1830-66 ENGS)
1/14 ACTUAL SIZE

BY _____

CHECKED _____

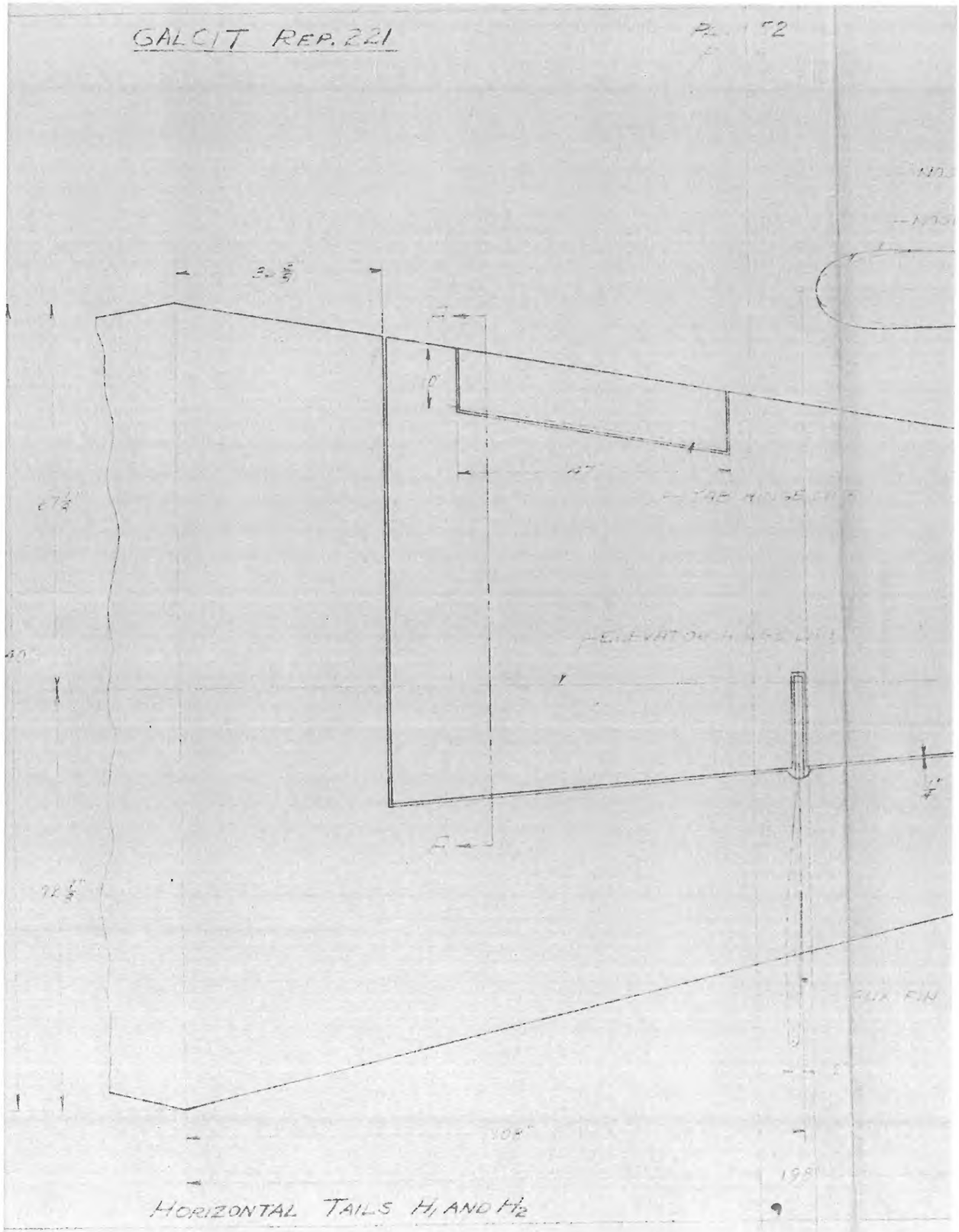
L.B.M.
9-18-38.



NACELLES N₂ (P&W 1830-76 ENGS.)
XPB2Y-1 PROPOSED PRODUCTION
MODEL

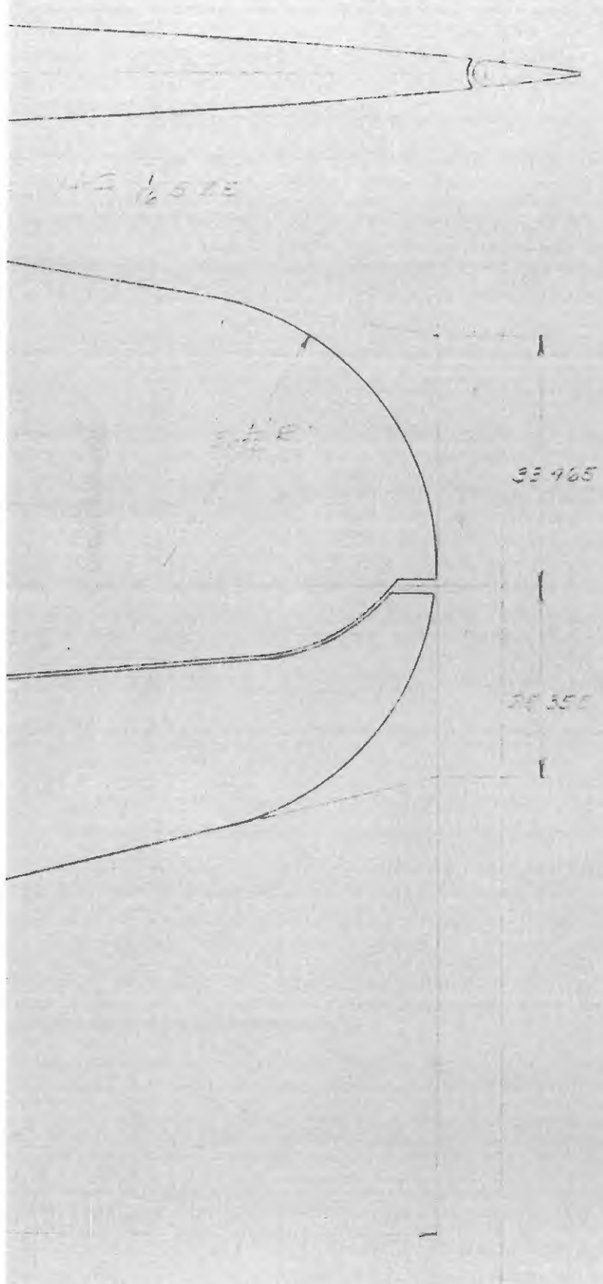
1/14 ACTUAL SIZE
8-30-38 (E.M.)

GALCIT REP. 221



HORIZONTAL TAILS H_1 AND H_{12}

HORIZONTAL TAIL
XPB2Y-1



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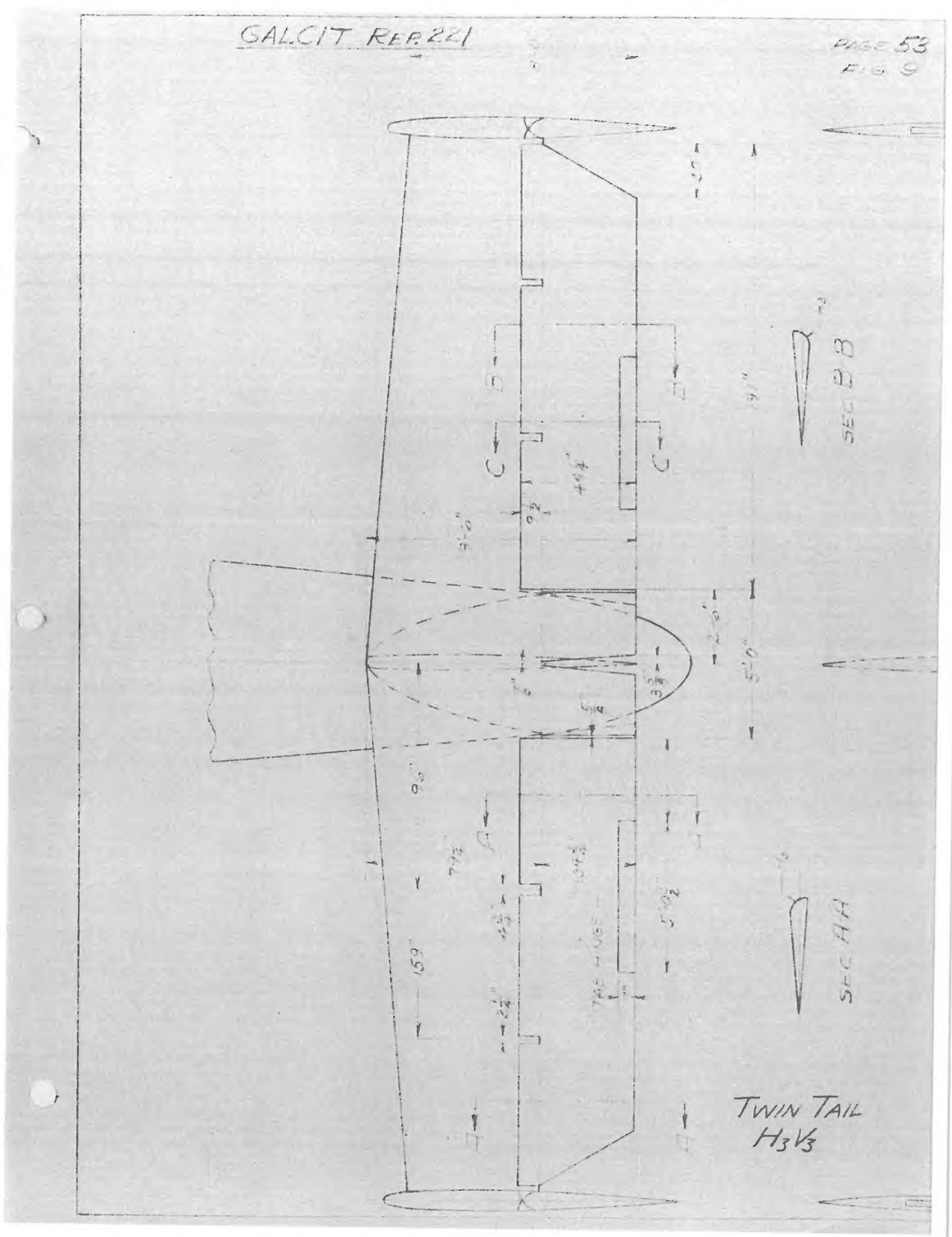
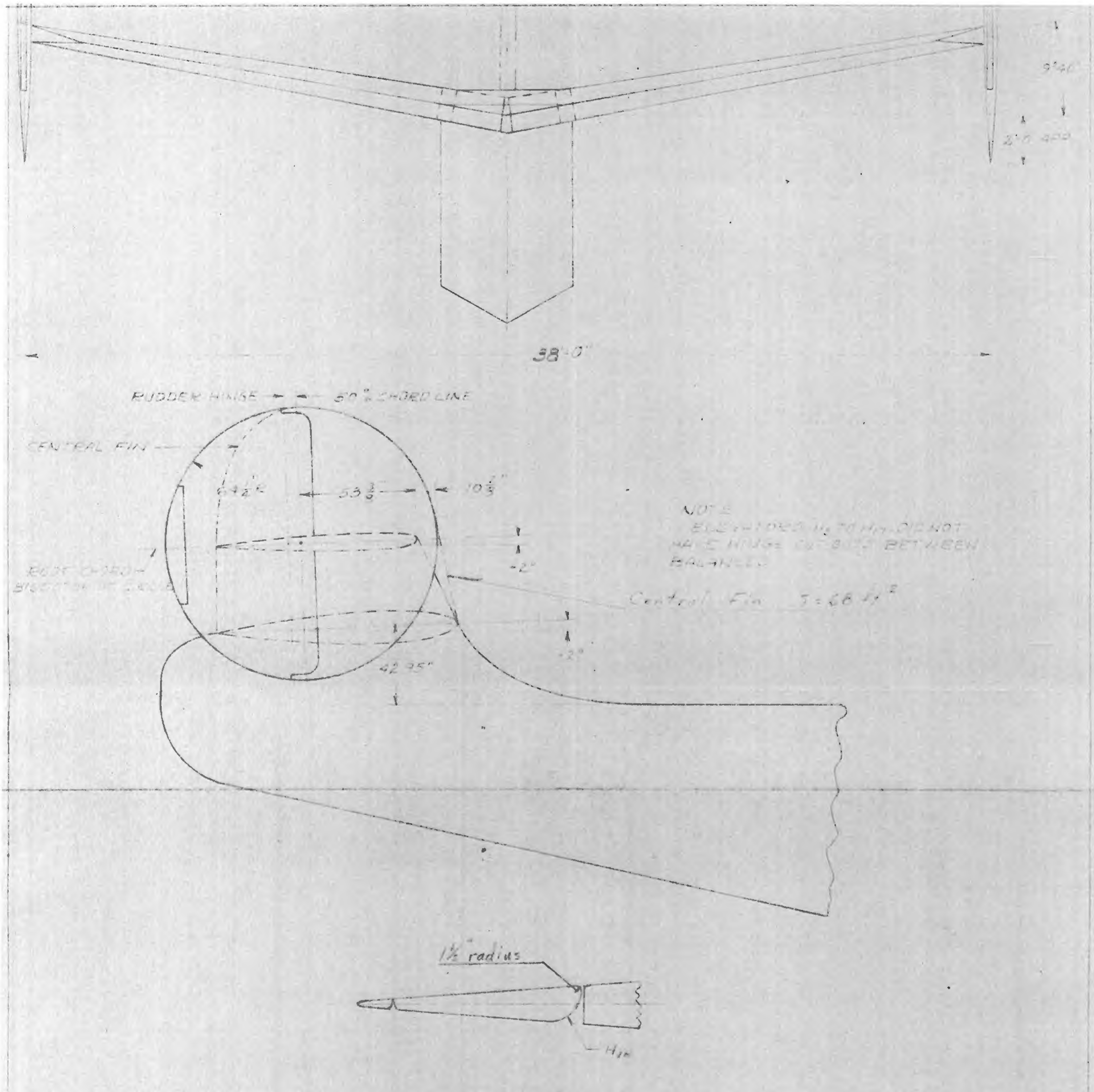




H_{19} SAME AS H_8 WITH CUTOUTS FOR HINGES ETC.
H_{18} SAME AS H_{19} WITH 1½" RADIUS ON NOSE AND NO FAIRING ON T.E. OF STABILIZER

TWIN TAIL (H_{18} & H_{19})
XPB2Y-1
GENERAL ARRANGEMENT & HORIZ. SURFACE DATA
SCALE ⅛"=1'-0" & NOTED

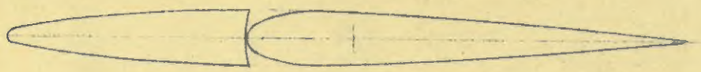
FORM NO. 154 PRYE & SMITH

GALCIT REP. 221

CONSOLIDATED AIRCRAFT CORPORATION

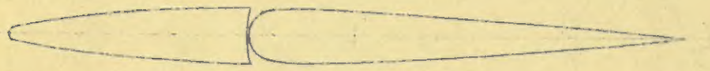
FIG. 10

MODEL _____ AIRPLANE REPORT NO. _____



H_1

22% BALANCE
POINTED NOSE
SEE 29.2041

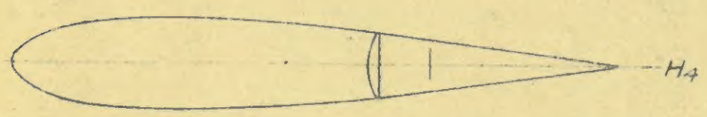


H_2

22 % BALANCE
ROUNDED NOSE
SEE 29.2041

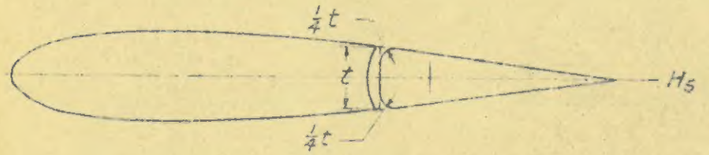
H_3

22.4 % BALANCE
9½" NOSE LENGTH
SEE 29.2043



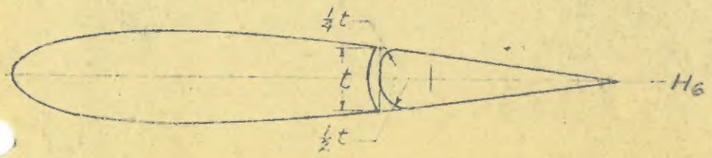
H_4

22.4% BALANCE
9½" NOSE LENGTH



H_5

22.4% BALANCE
9½" NOSE LENGTH



H_6

22.4% BALANCE
9½" NOSE LENGTH

BY _____

CHECKED

STABILIZER AND RUDDER PROFILES IN $H_1, H_2, H_3, H_4, H_5, H_6$

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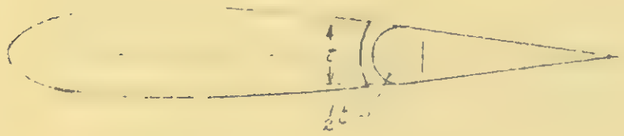
CONSOLIDATED AIRCRAFT CORPORATION

FIG 11

MODEL ... AIRPLANE REPORT NO. ...

H_6 +1.5" GAP

22.4% BALANCE
9½" NOSE LENGTH



H_7

22.4% BALANCE
9½" NOSE LENGTH

H_8

22.4% BALANCE
9½" NOSE LENGTH

H_9

24.1% BALANCE
NOSE LENGTH { 10" TIP / 11" ROOT

SAME AS H_8 EXCEPT FOR EXTENSION OF NOSE

H_{10}

27.3% BALANCE
NOSE LENGTH { 12" TIP / 13" ROOT

SAME AS H_8 EXCEPT FOR EXTENSION OF NOSE

H_{11}

27.3% BALANCE
NOSE LENGTH { 12" TIP / 13" ROOT

H_{11} = H_{10} WITH LOWER NOSE EXTENDED SO AS NOT TO [illegible] FOR -10° ELEVATOR

BY. ...

CHECKED

STABILIZER AND RUDDER PROFILES IN H_6 +1.5" GAP, H_7, H_8, H_9, H_{10}, H_{11}.

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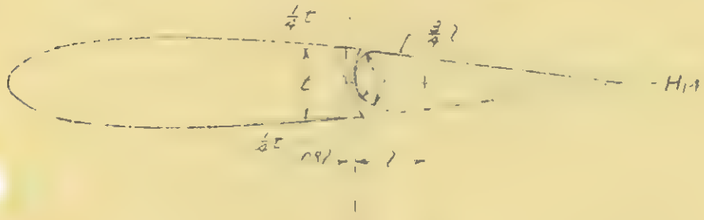
MODEL AIRPLANE REPORT NO

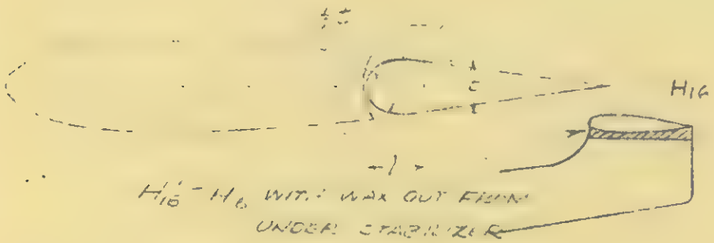
H_{12}

H_{13}



H_{14}

H_{15}



H_{16}

H_{16} - H_{16} WITH WAX OUT FROM UNDER STABILIZER

H_{17}

BY

CHECKED

STABILIZER AND RUDDER PROFILES IN H_{12}, H_{13}, H_{14}, H_{15}, H_{16}, H_{17}

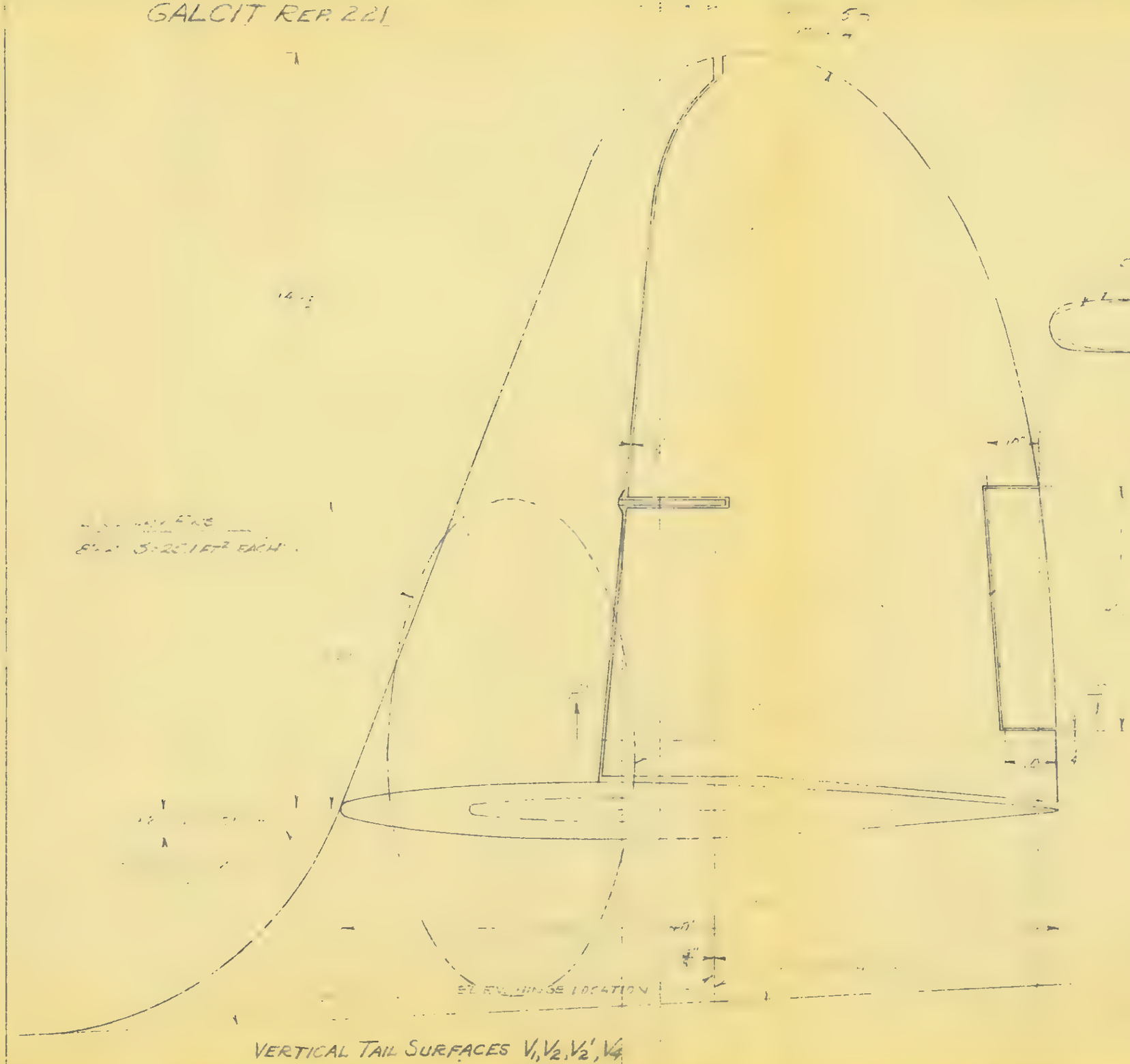
$H_{1,0}$

21.7 % BALANCE
SAME AS $H_{1,0}$ WITH
HINGE CUT [illegible]

$H_{1,8}$

21.4% BALANCE
SAME AS $H_{1,9}$ WITH
1½" RADIUS ON [illegible]
OF NO.

STABILIZER AND RUDDER PROFILES IN $H_{1,8}$ AND $H_{1,9}$



NOTE:
V_1, V_2, V_2', V_2'' INCLUDE AU
$V_4 = V_2$ MINUS AUXILIARY
INCLUDING SMALL BE
MAIN SURFACE AUXIL

VERTICAL TAIL SURFACES V_1, V_2, V_2', V_4

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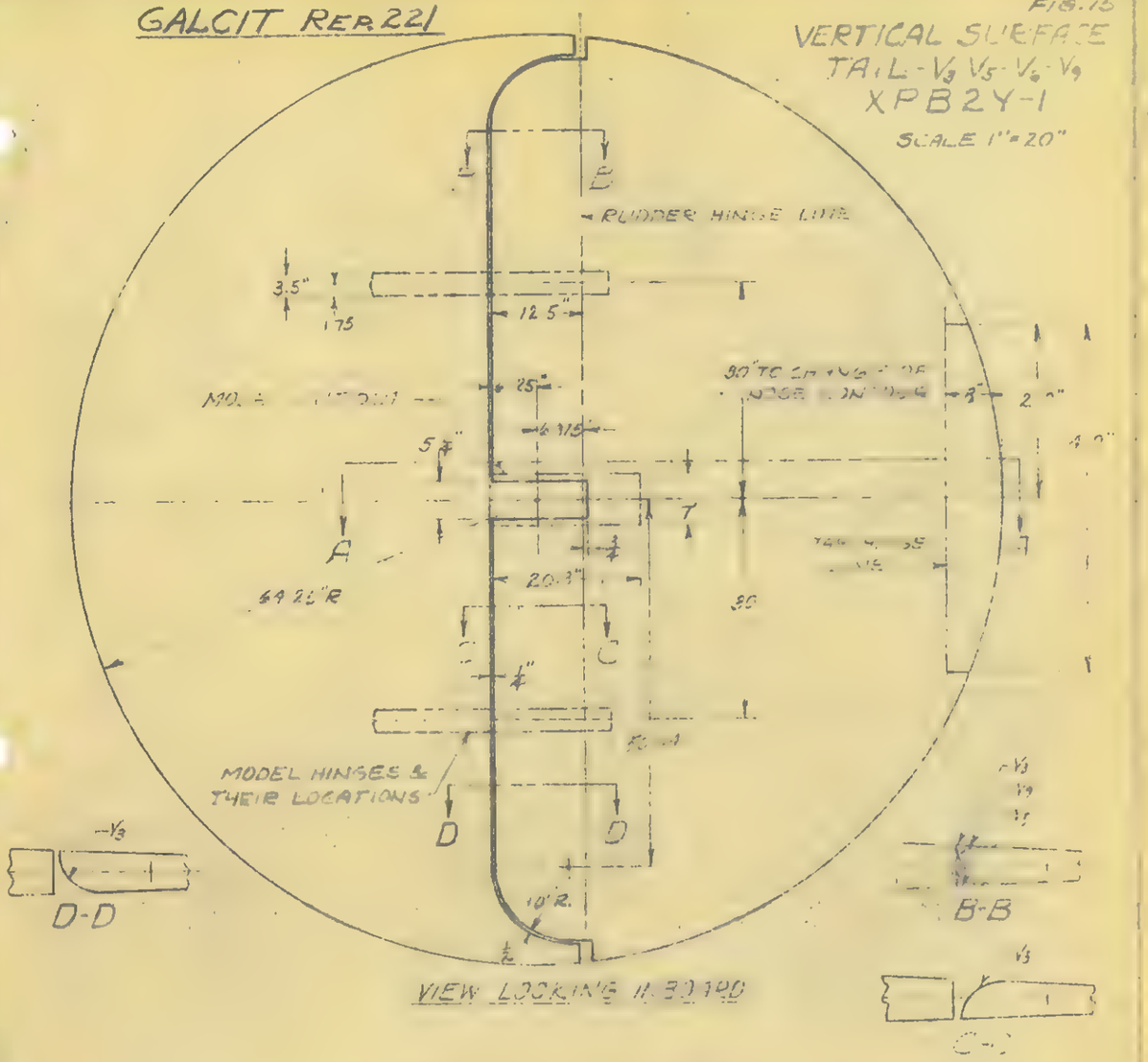
FIG. 15

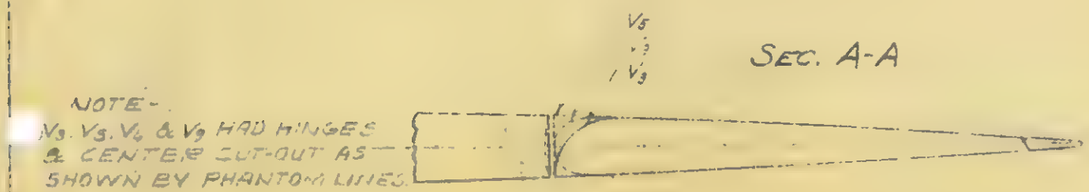
VERTICAL SURFACE
TAIL - V_3 V_5 V_6 V_9
XPB2Y-1

SCALE 1" = 20"



V_6 = V_3 + CENTRAL FIN

V_{11} SAME AS V_3 BUT WITH NO HINGE CUTOUTS AND CORRECT SIZE CENTER CUTOUT



VERTICAL TAIL SURFACES V_3, V_5, V_6, AND V_9

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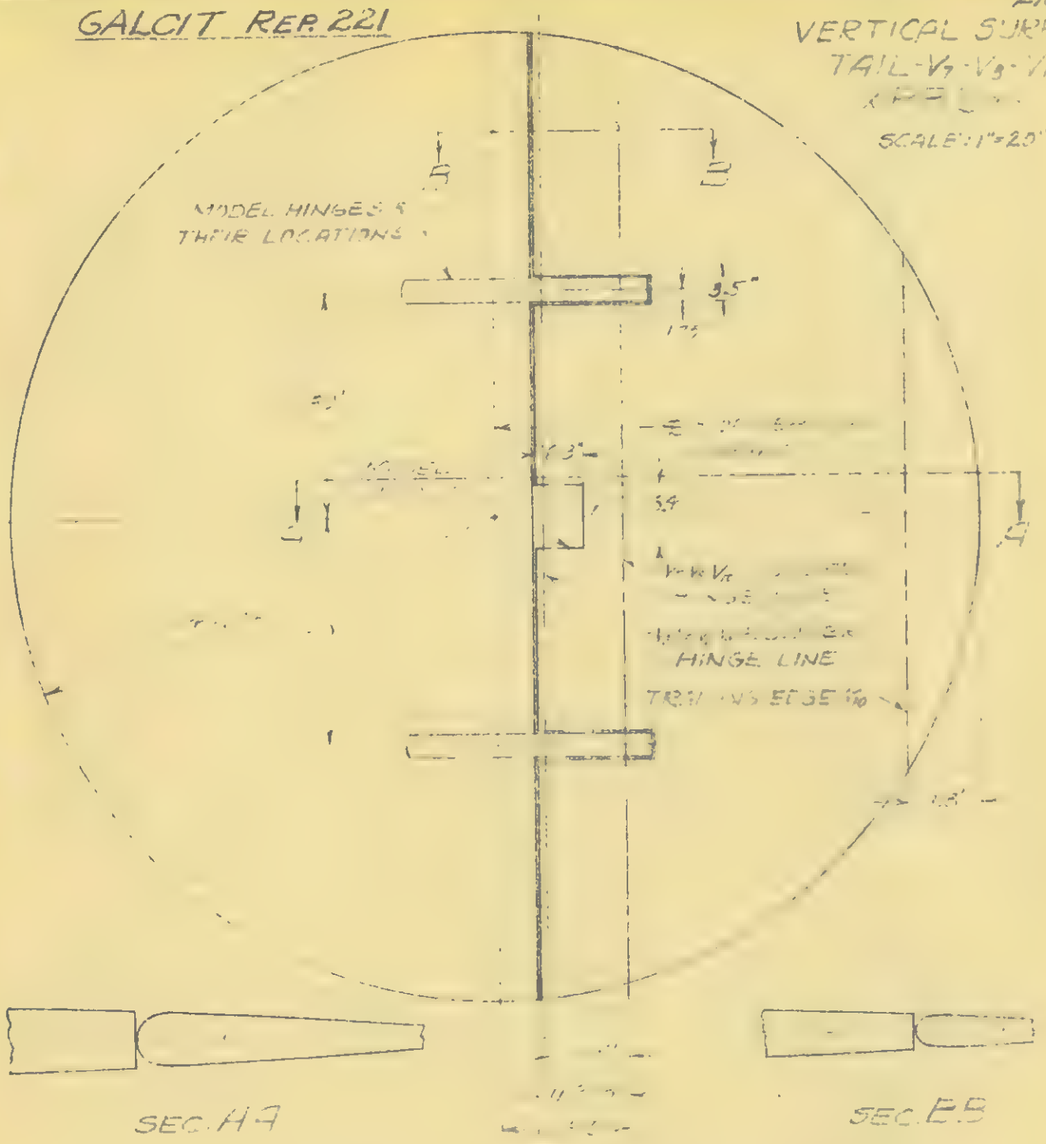
FIG. 16

VERTICAL SURFACE
TAIL - V_7 - V_8 - V_{10}
APPL...

SCALE: 1" = 2.5"



NOTE: $V_7 = V_8$ + CENTRAL VERTICAL SURFACE

ACTUAL AREA OF RUDDER, AFT OF HINGE, IN V_{10} IS 27.00 FT.² (EACH). NOMINAL AREA AND CHORD SAME AS IN V_8, HAVE BEEN USED IN COMPUTING C_{H_r}

VERTICAL TAIL SURFACES V_7, V_8, V_{10}

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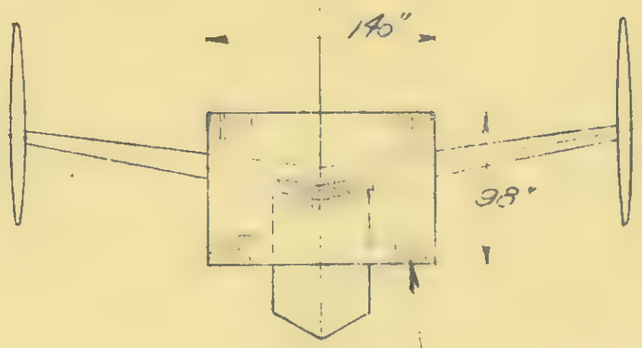
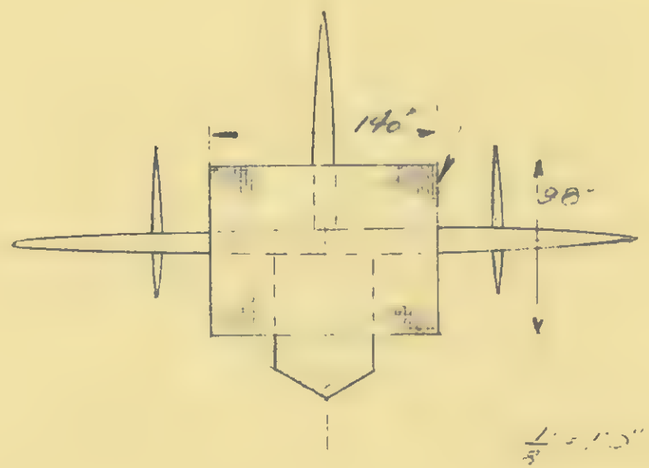
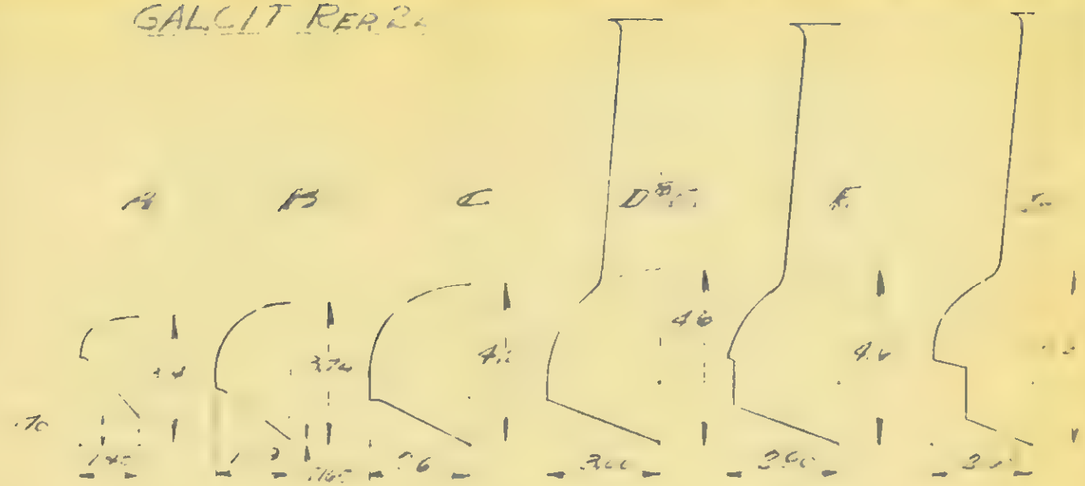


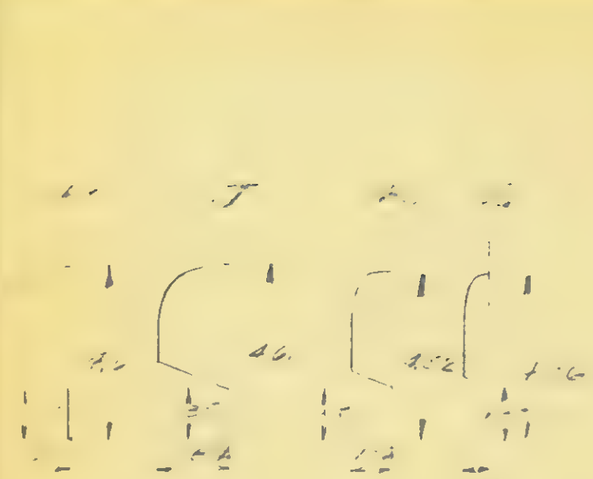
GRID - ½" MESH WIRE

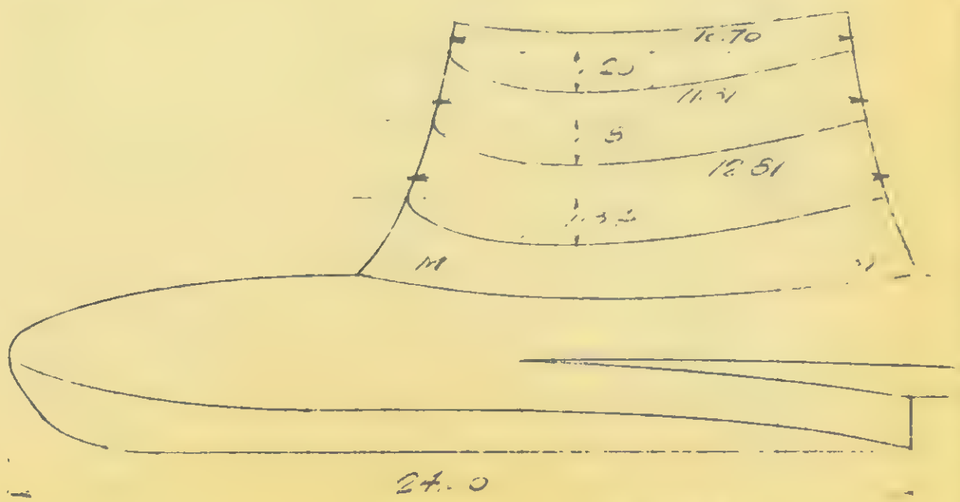


G TO SIMULATE CANTILEVER

GALCIT RER 24







NACA NO 35

VERTICAL SECTION THROUGH 10 FT. WIND TUNNEL

GUGGENHEIM AERONAUTICS LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY, PASADENA

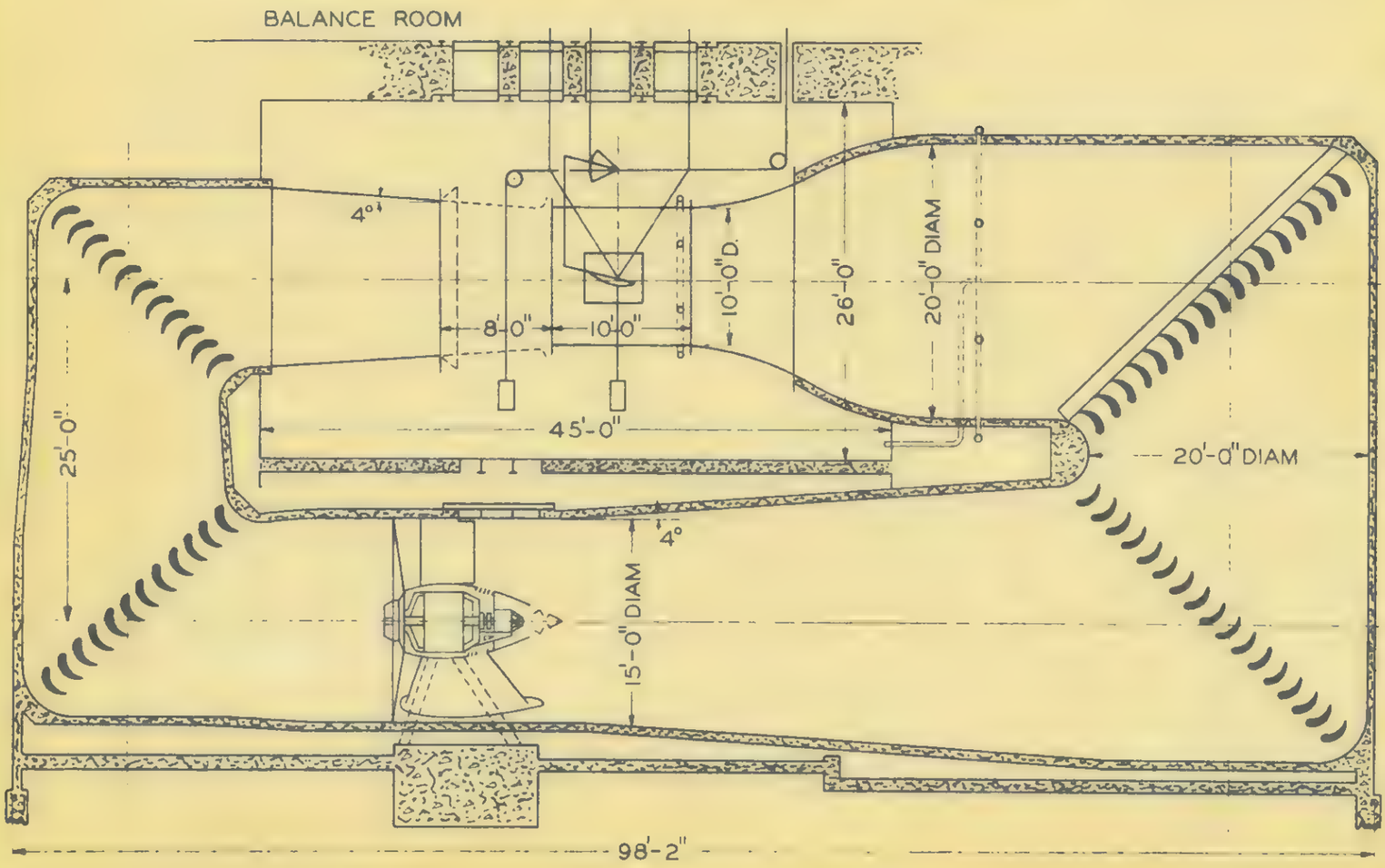


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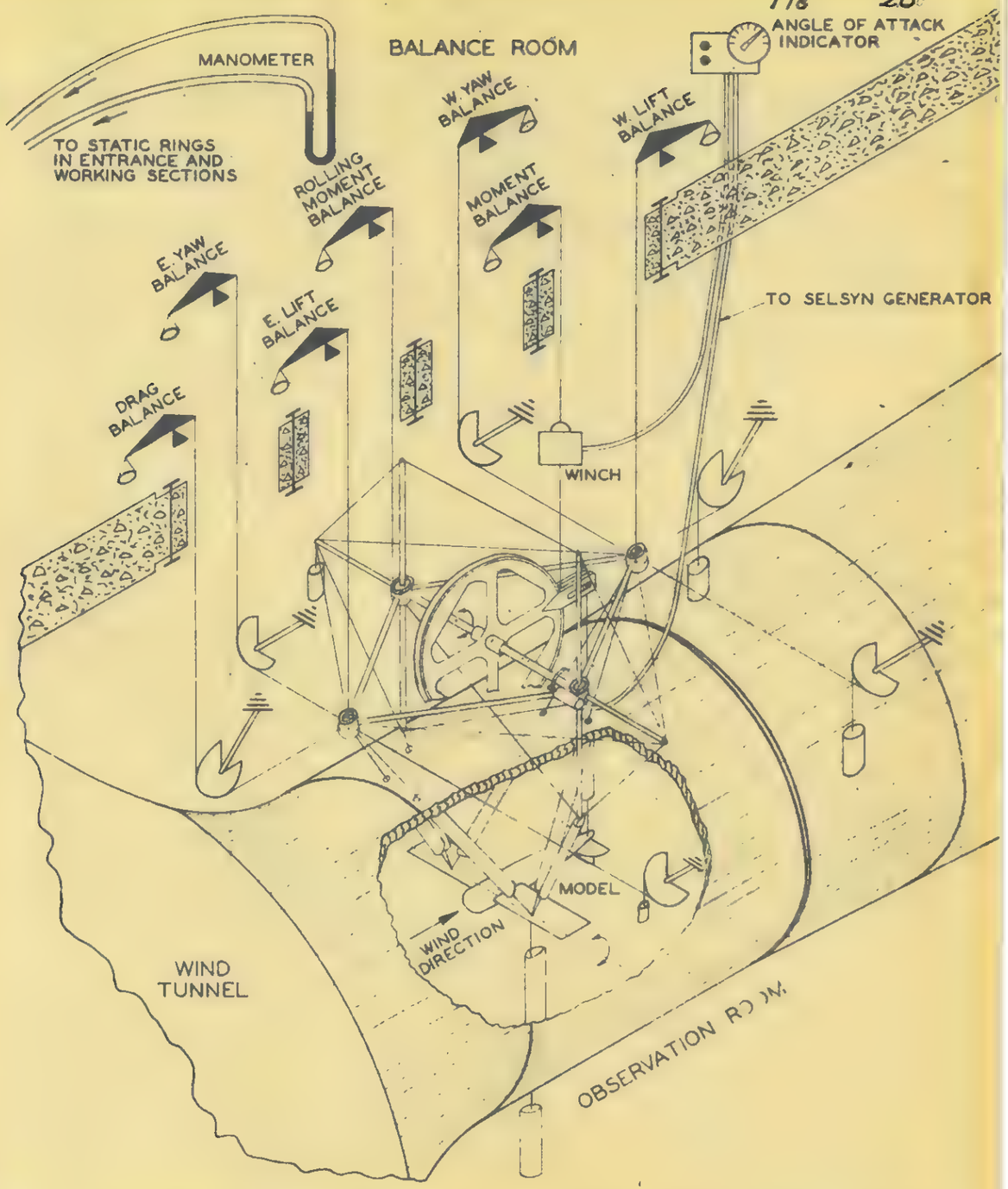
FIG 19



SIX COMPONENT SETUP FOR TEN FOOT WIND TUNNEL TESTS
AT GUGGENHEIM AERONAUTICS LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY

FIG.

DWG. WT 26

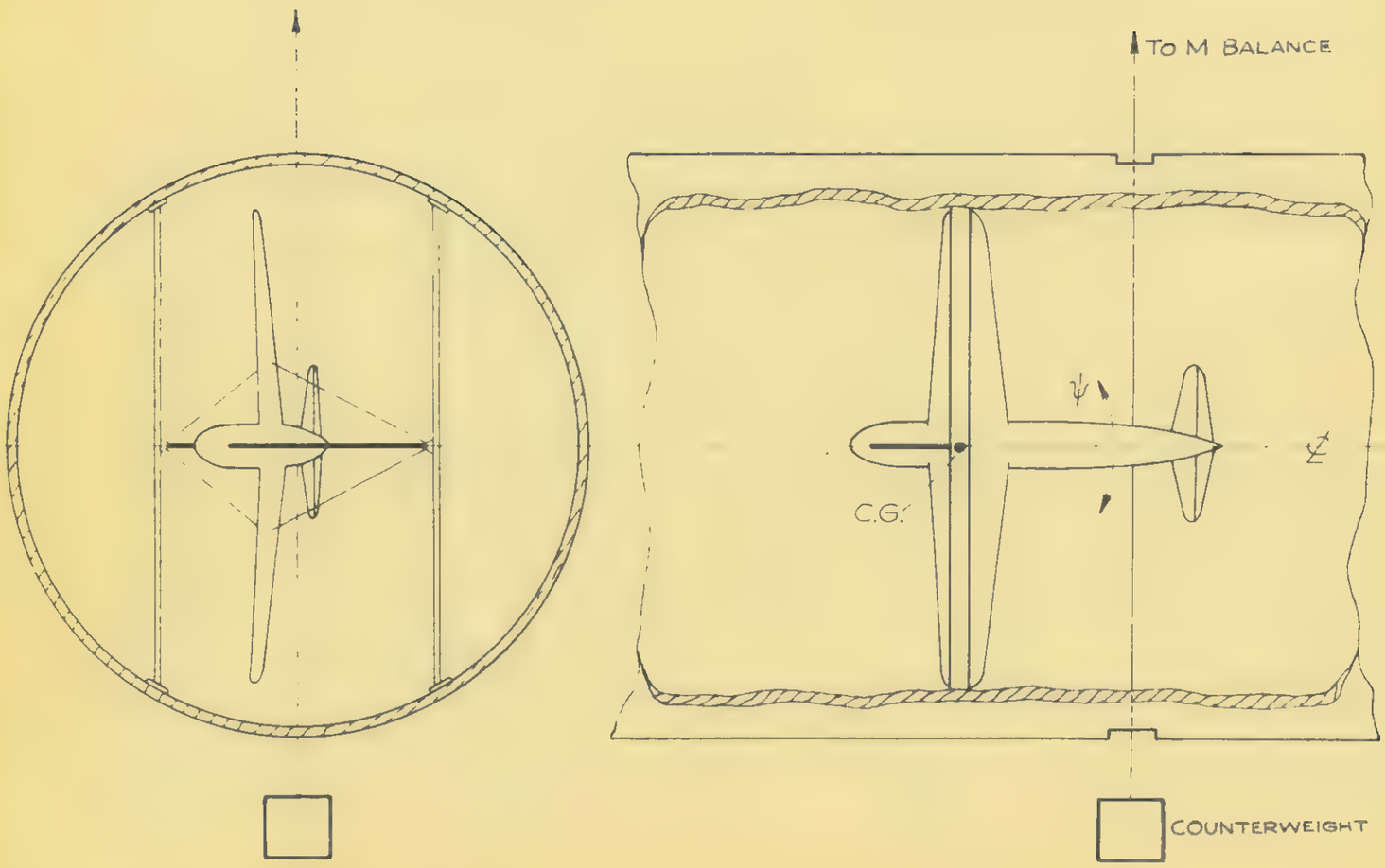


DIAGRAM SHOWING RIGGING FOR YAW-AT-YAW

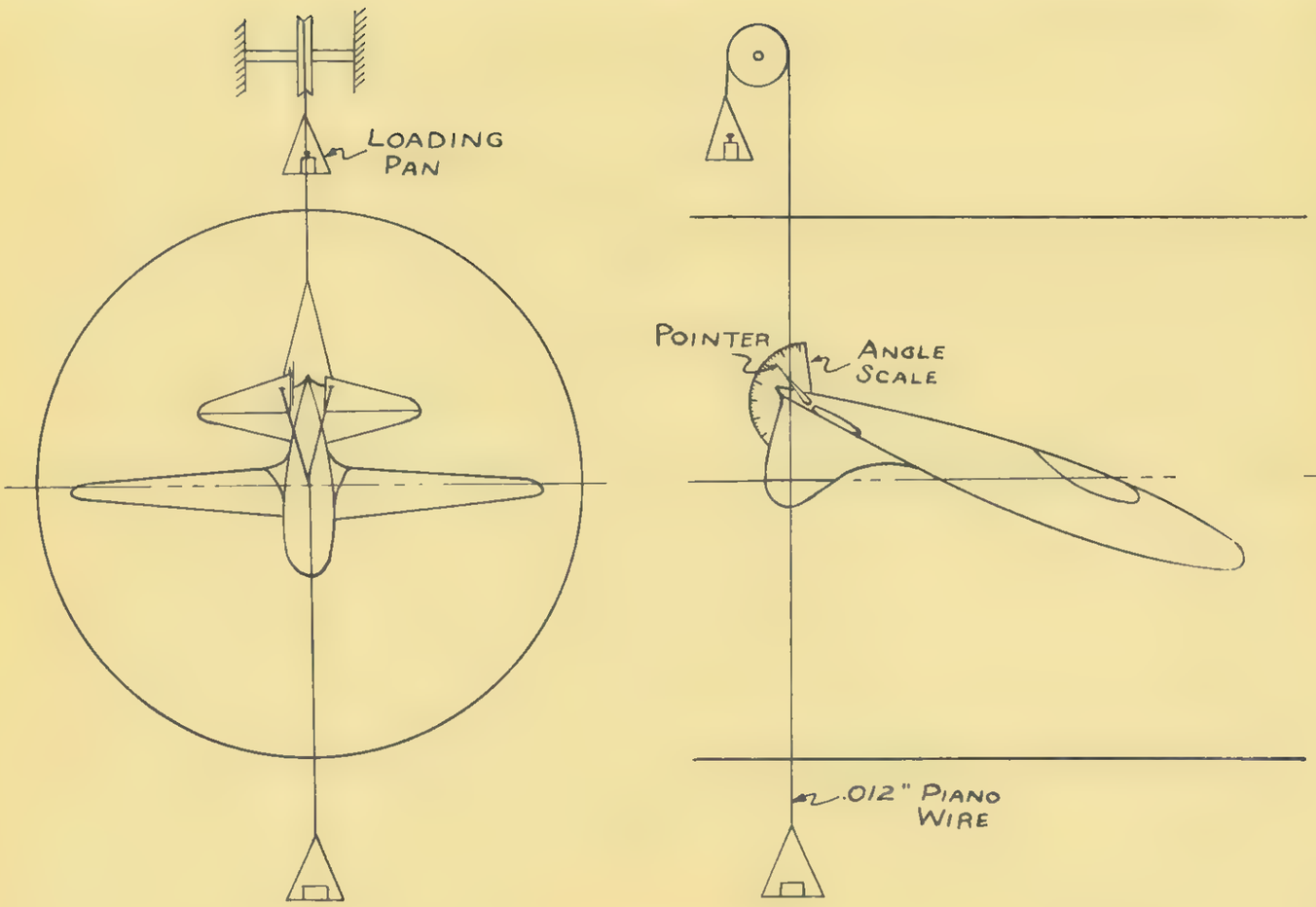


DIAGRAM SHOWING ELEVATOR
HINGE MOMENT SETUP

GALCIT Rep 221

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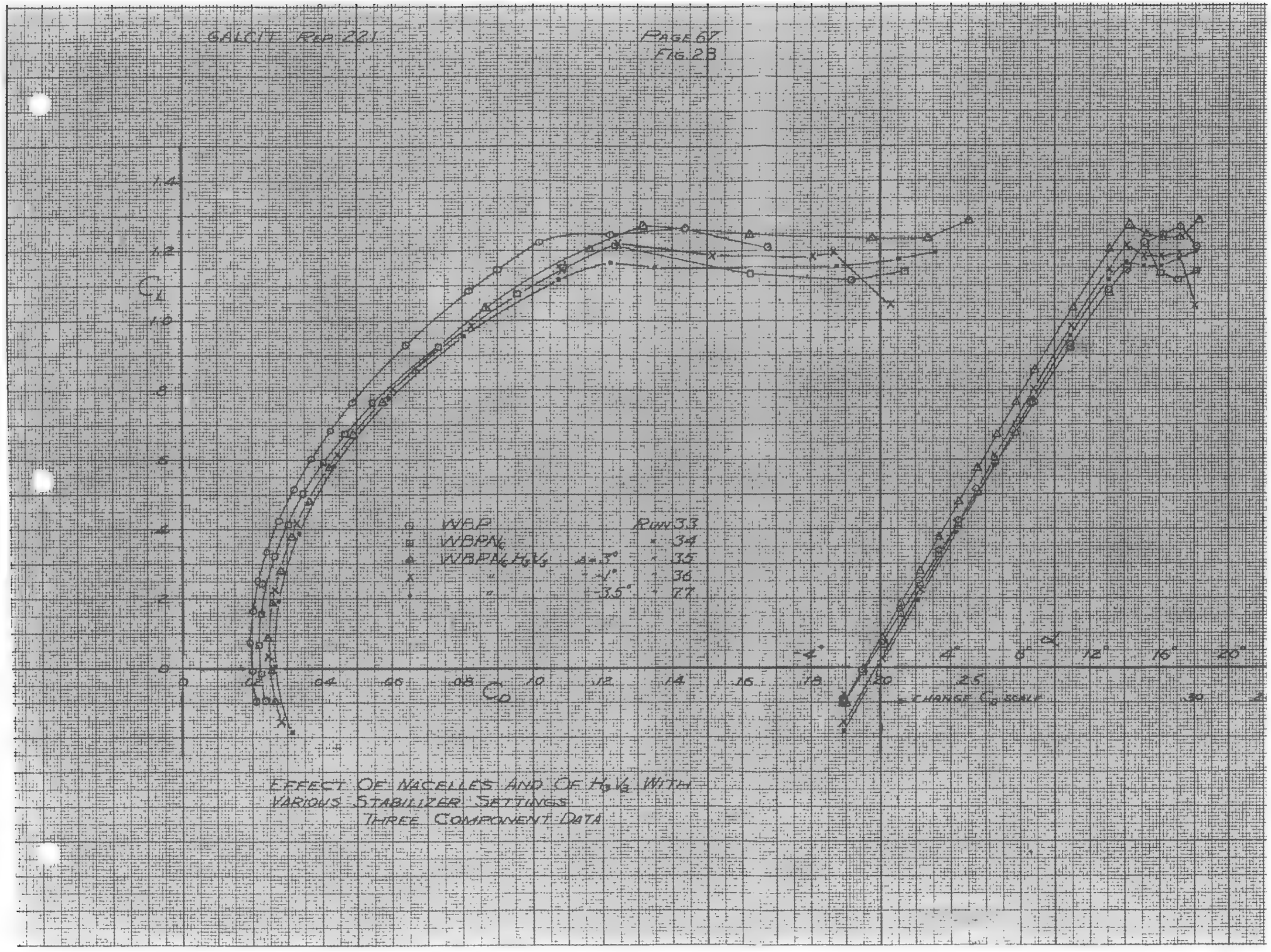
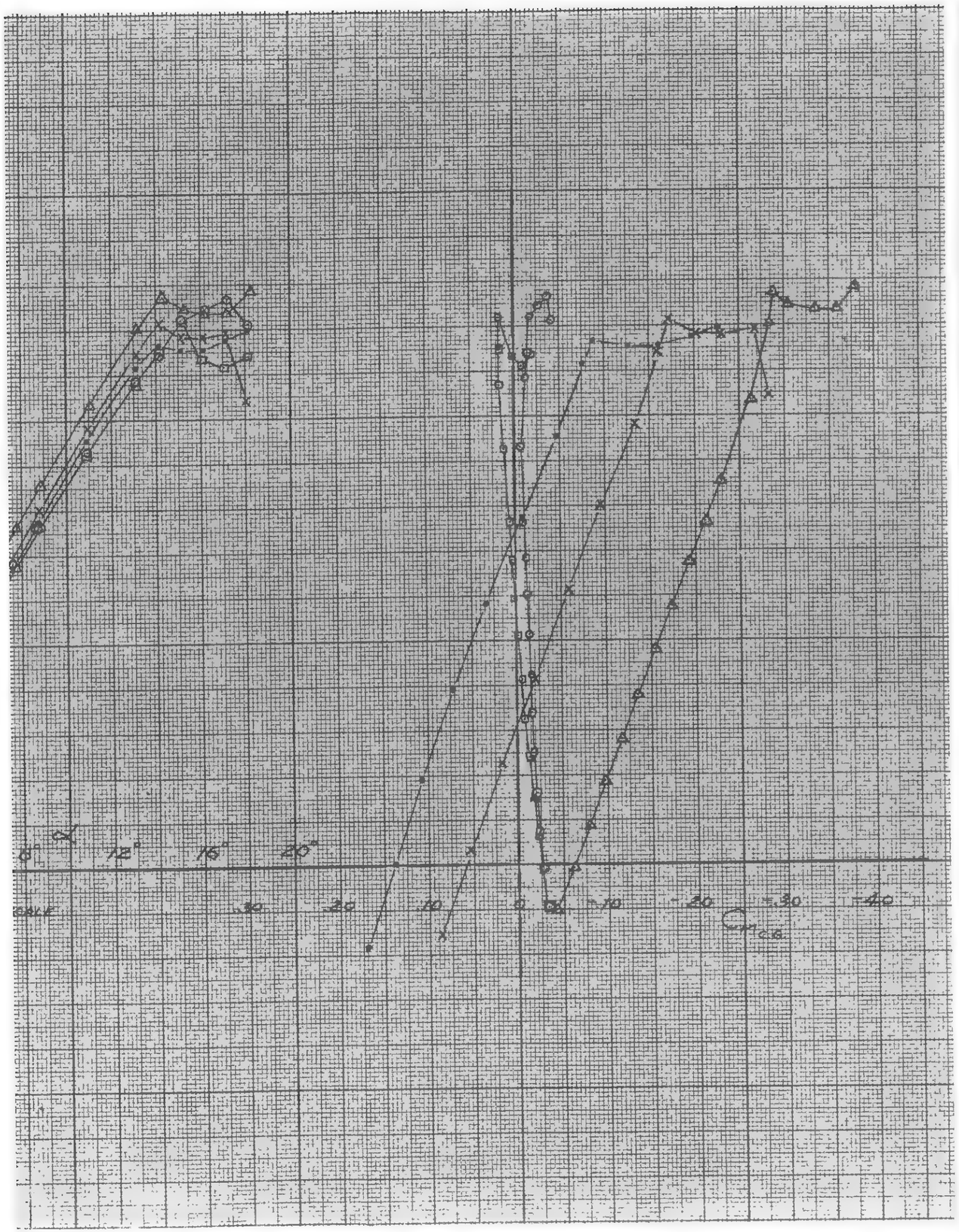
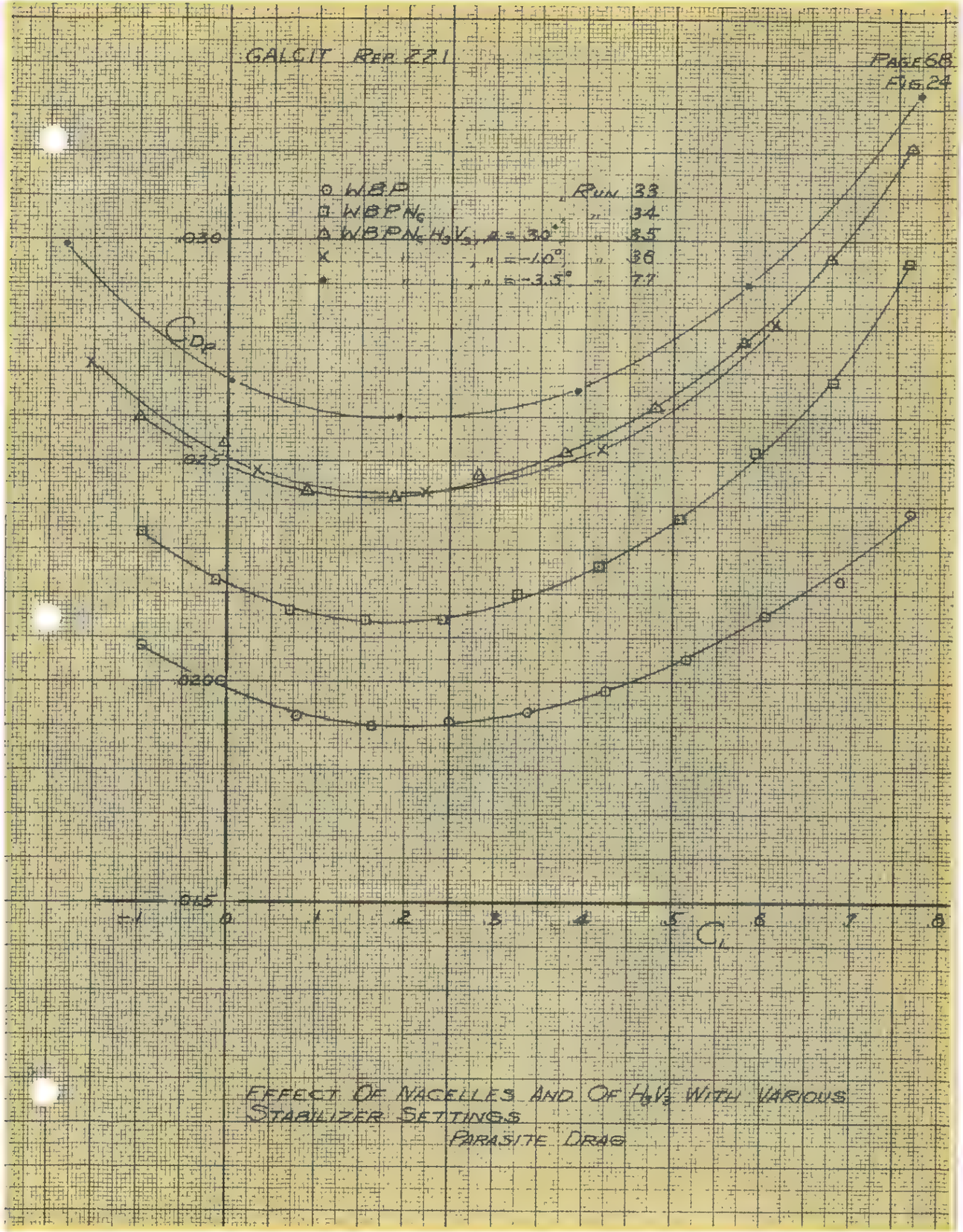
FIG. 23



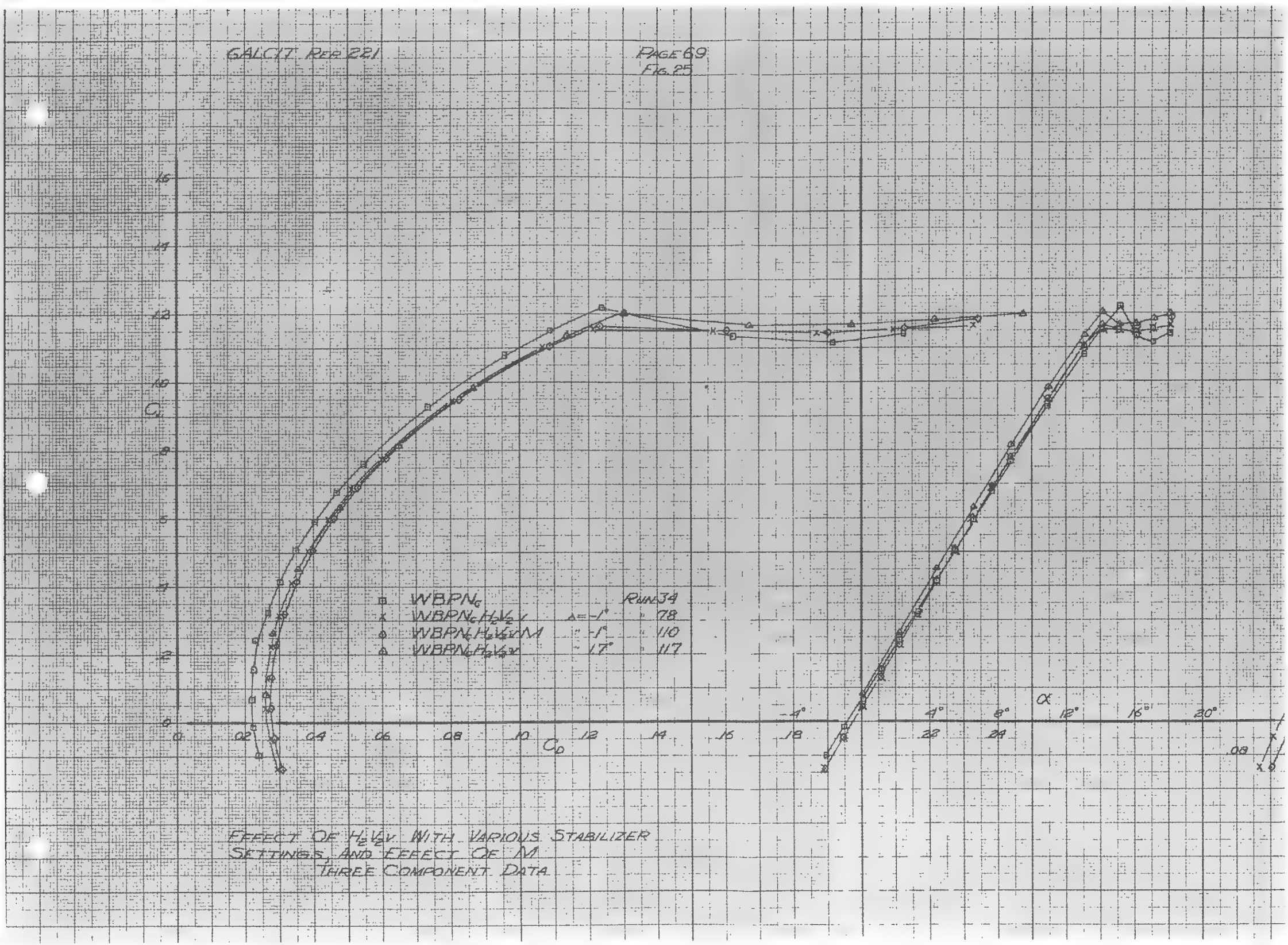
EFFECT OF NACELLES AND OF H_3V_3 WITH VARIOUS STABILIZER SETTINGS
THREE COMPONENT DATA


8°
12°
16°
20°
-30
-20
-10
0
-10
-20
-30
-40
$C_{m_{c/4}}$

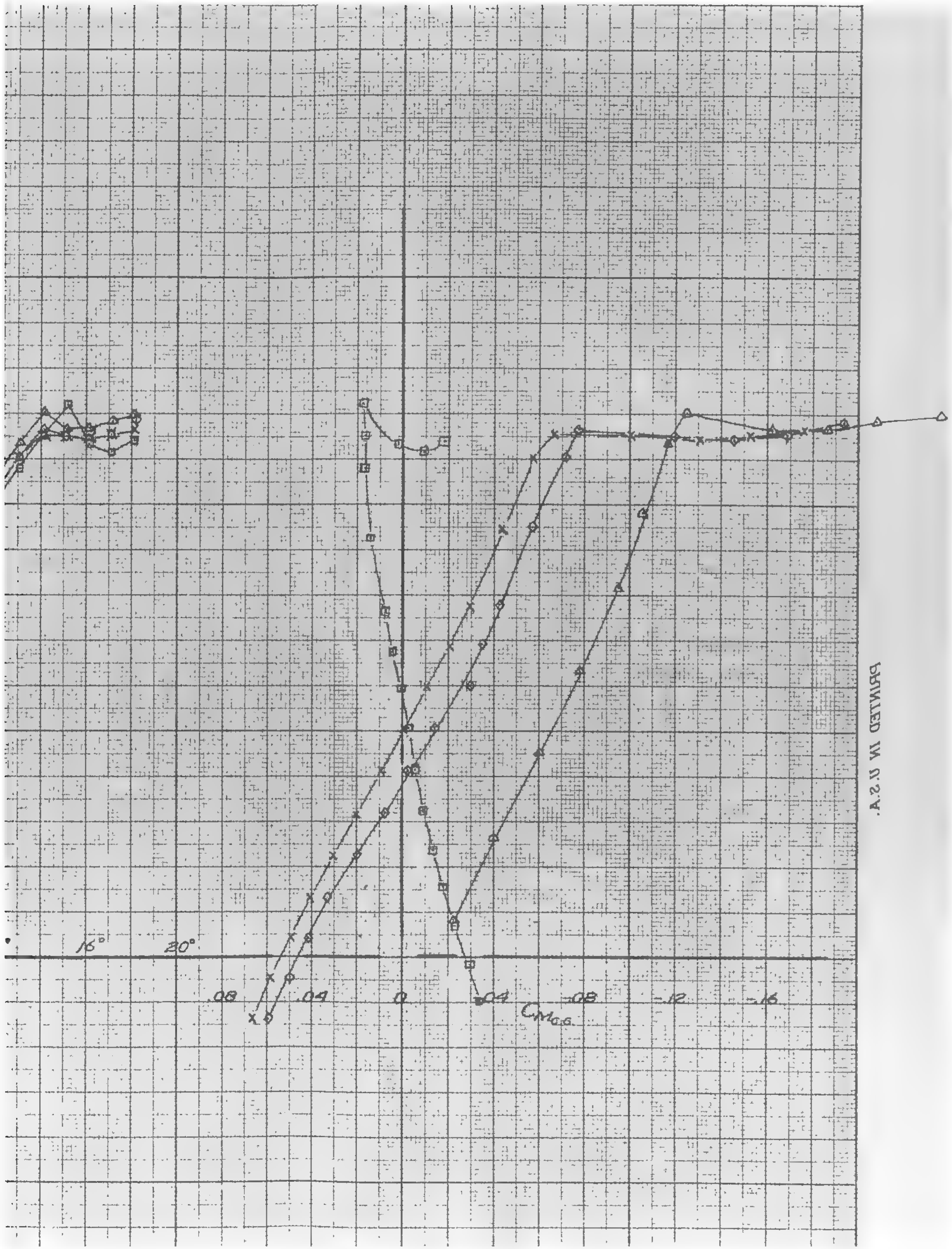


EFFECT OF NACELLES AND OF H_3V_3 WITH VARIOUS STABILIZER SETTINGS

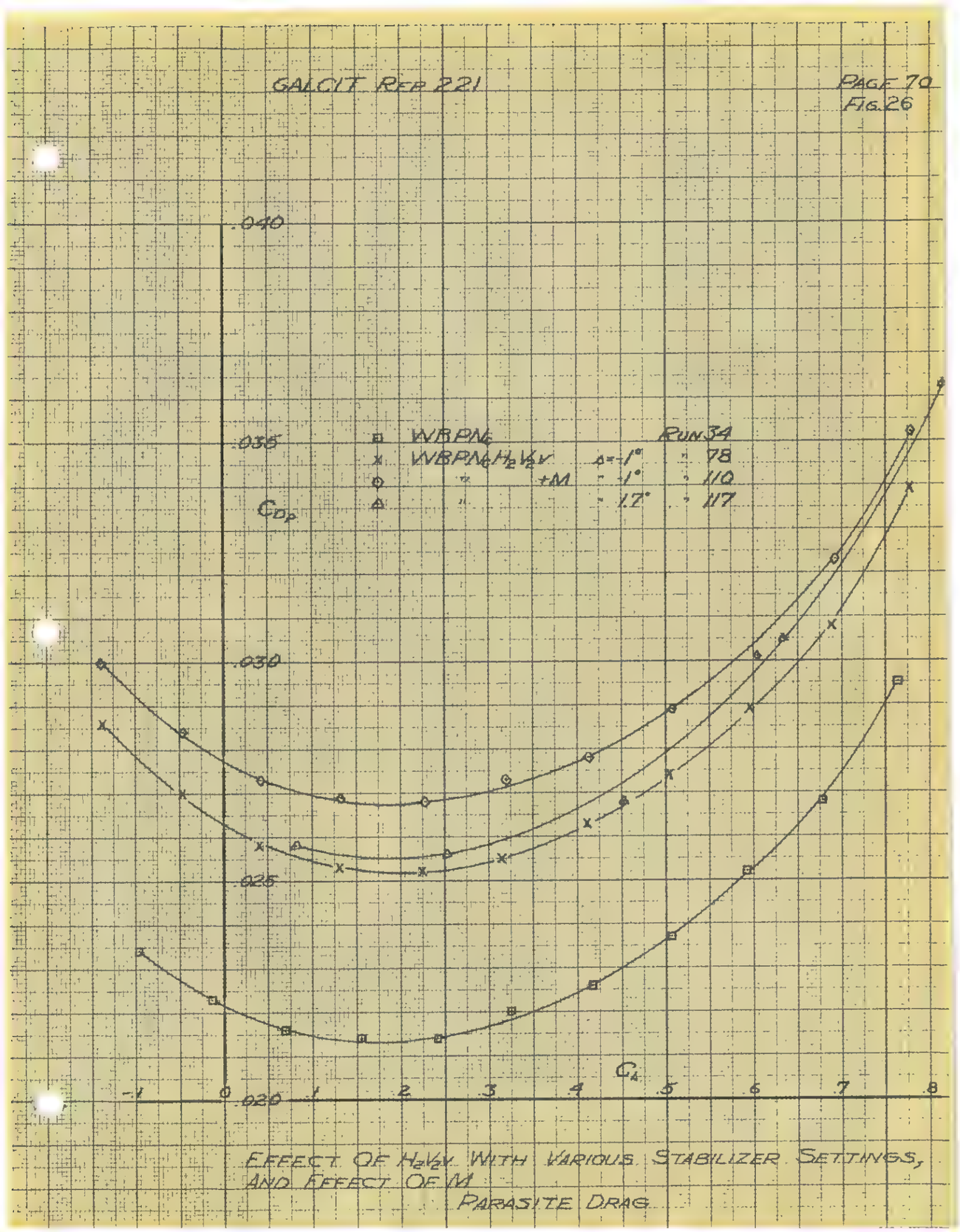
PARASITE DRAG



EFFECT OF H_2V_{2v} WITH VARIOUS STABILIZER SETTINGS, AND EFFECT OF M
THREE COMPONENT DATA

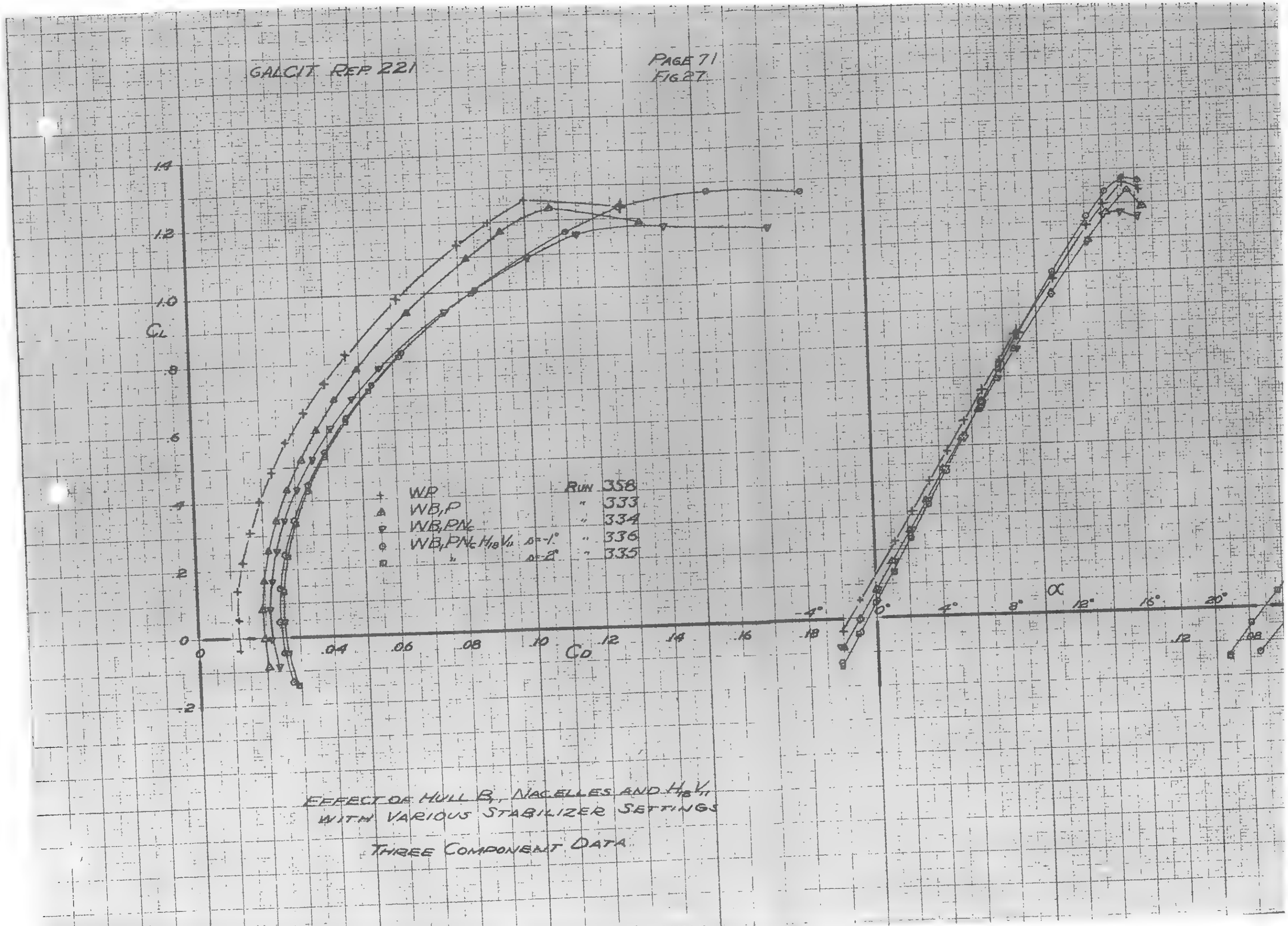


PRINTED IN U.S.A.



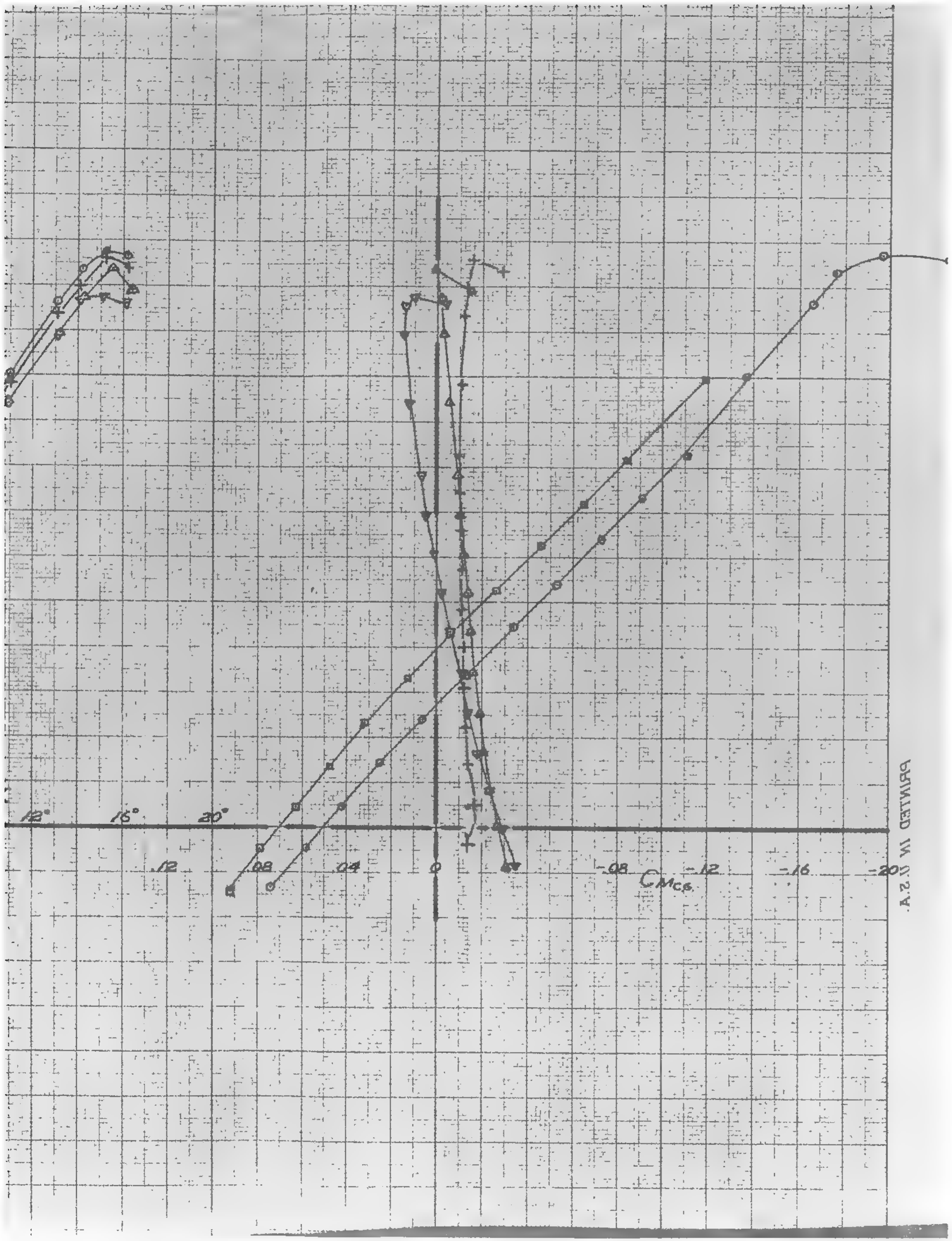
EFFECT OF H_2V_2V WITH VARIOUS STABILIZER SETTINGS, AND EFFECT OF M

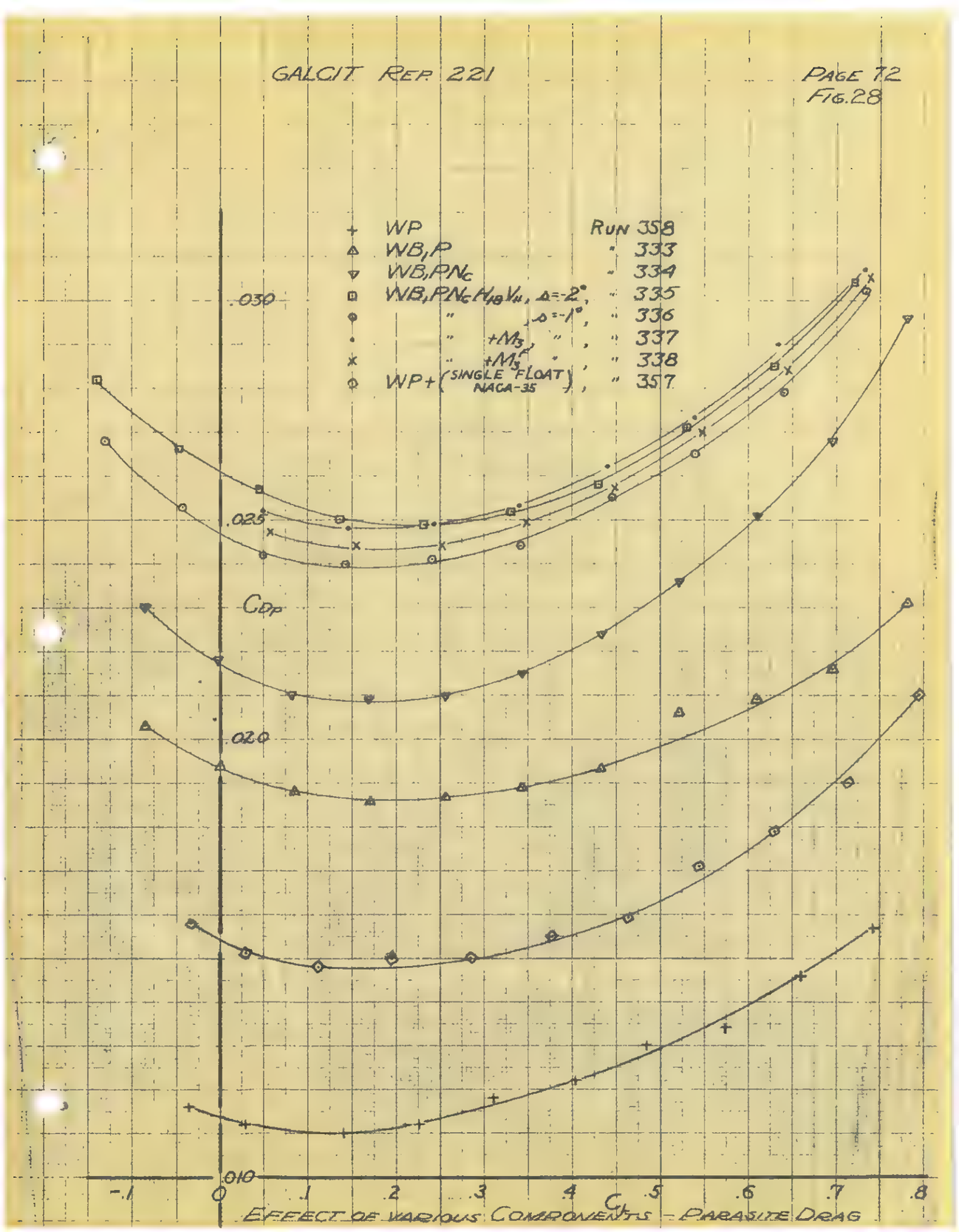
PARASITE DRAG



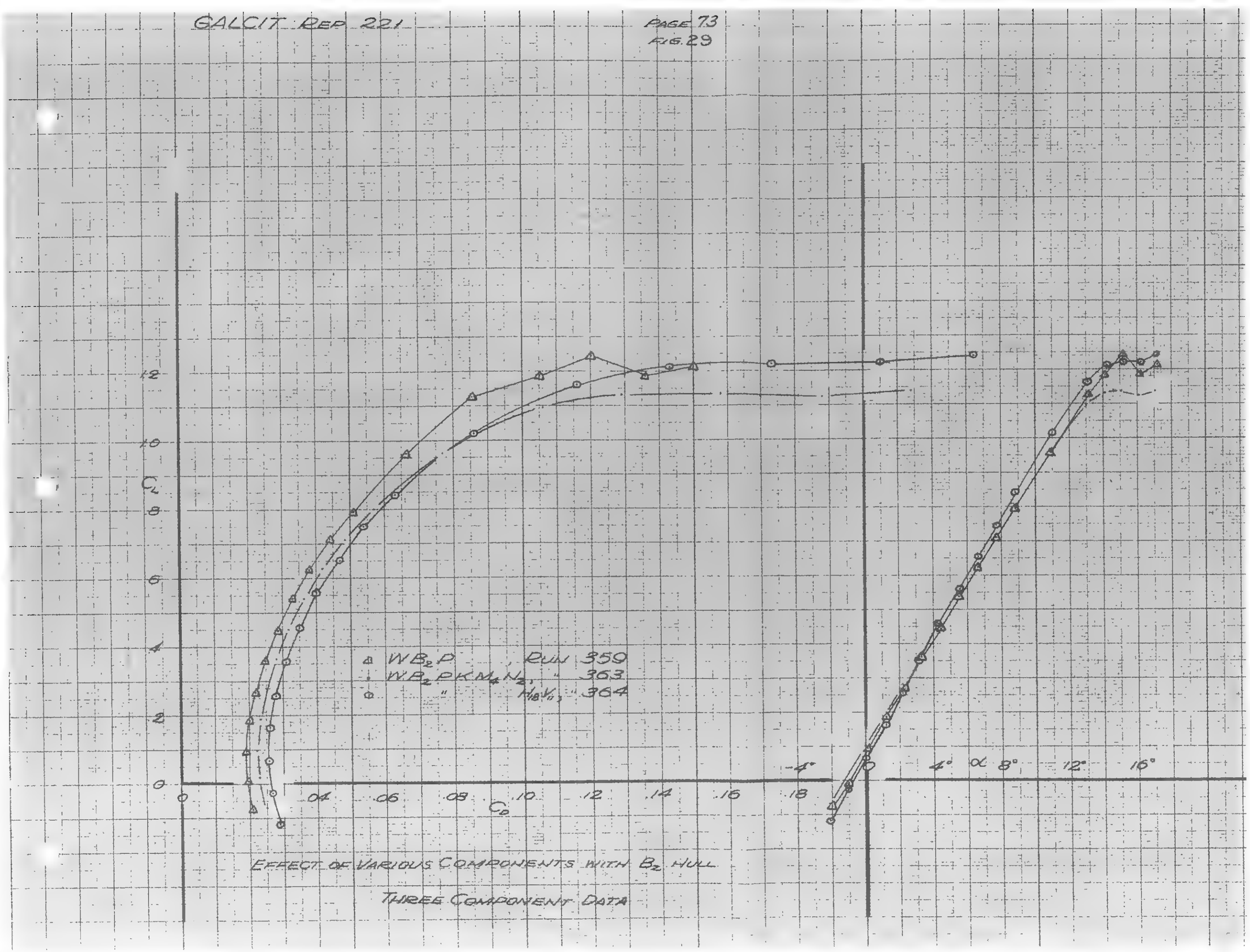
EFFECT OF HULL B$_1$, NACELLES AND H$_{18}$V$_{11}$ WITH VARIOUS STABILIZER SETTINGS

THREE COMPONENT DATA


12°
15°
20°
.12
.08
.04
0
-.08
-.12
-.16
-.20
$C_{M_{CG}}$
PRINTED IN U.S.A.

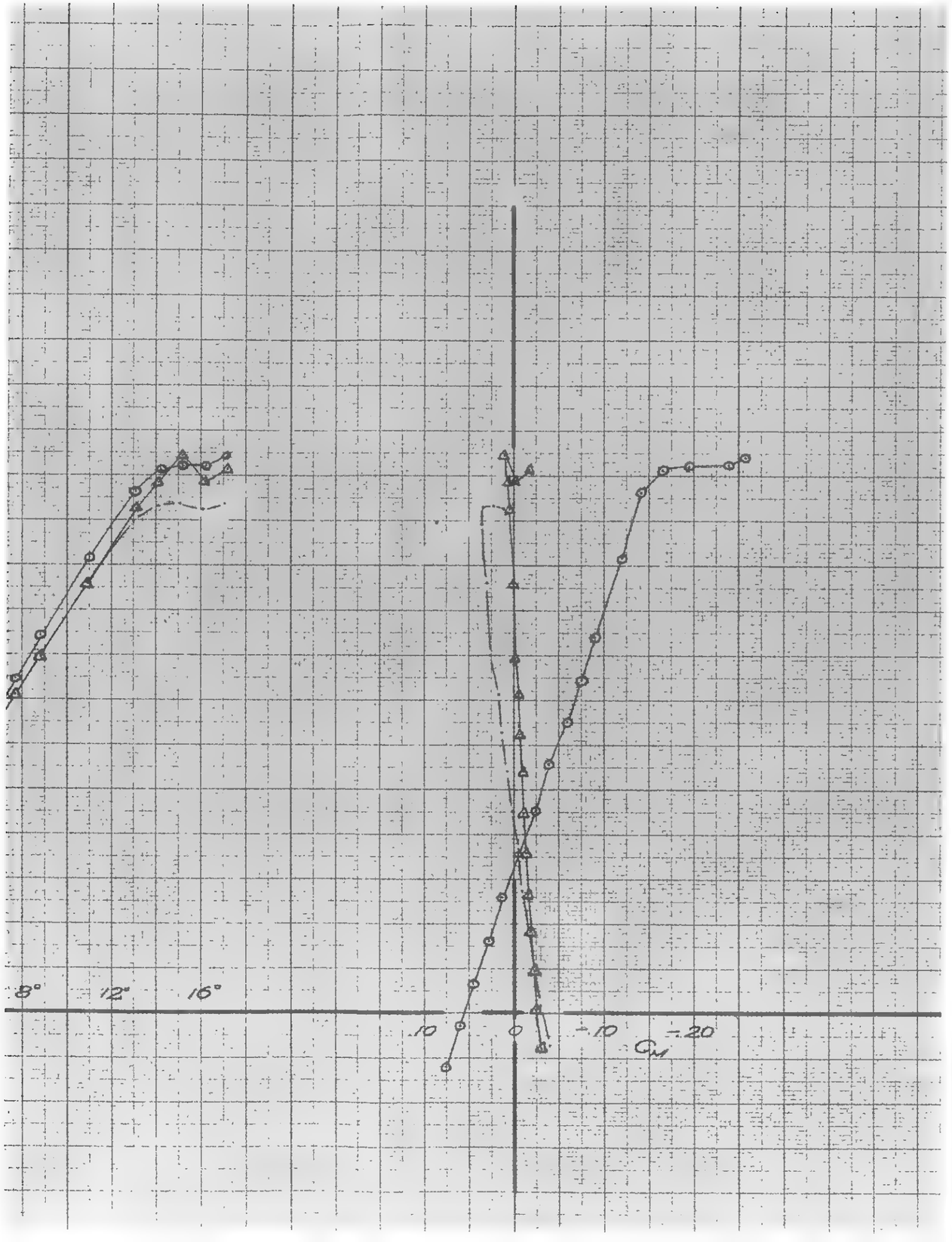


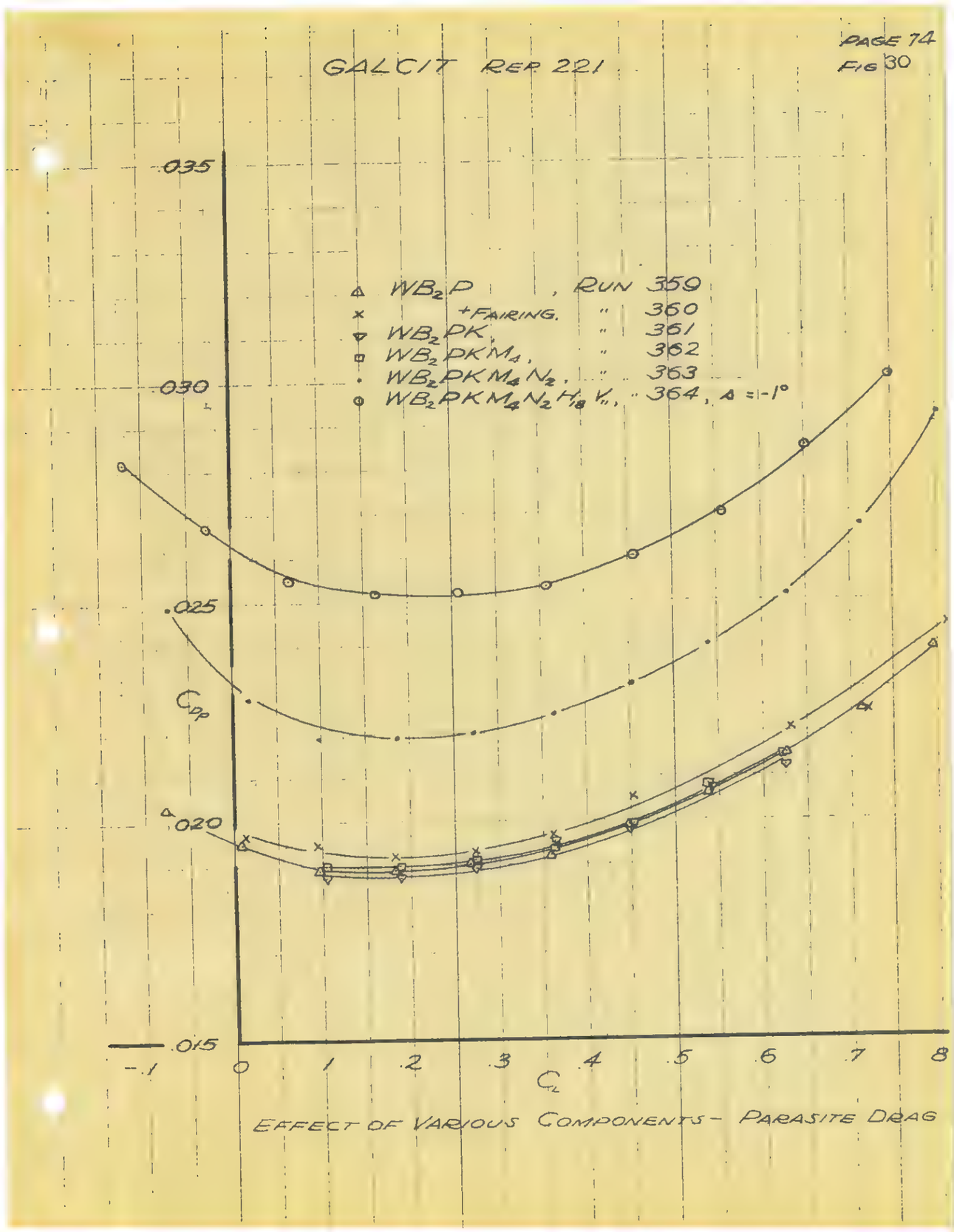
EFFECT OF VARIOUS COMPONENTS - PARASITE DRAG



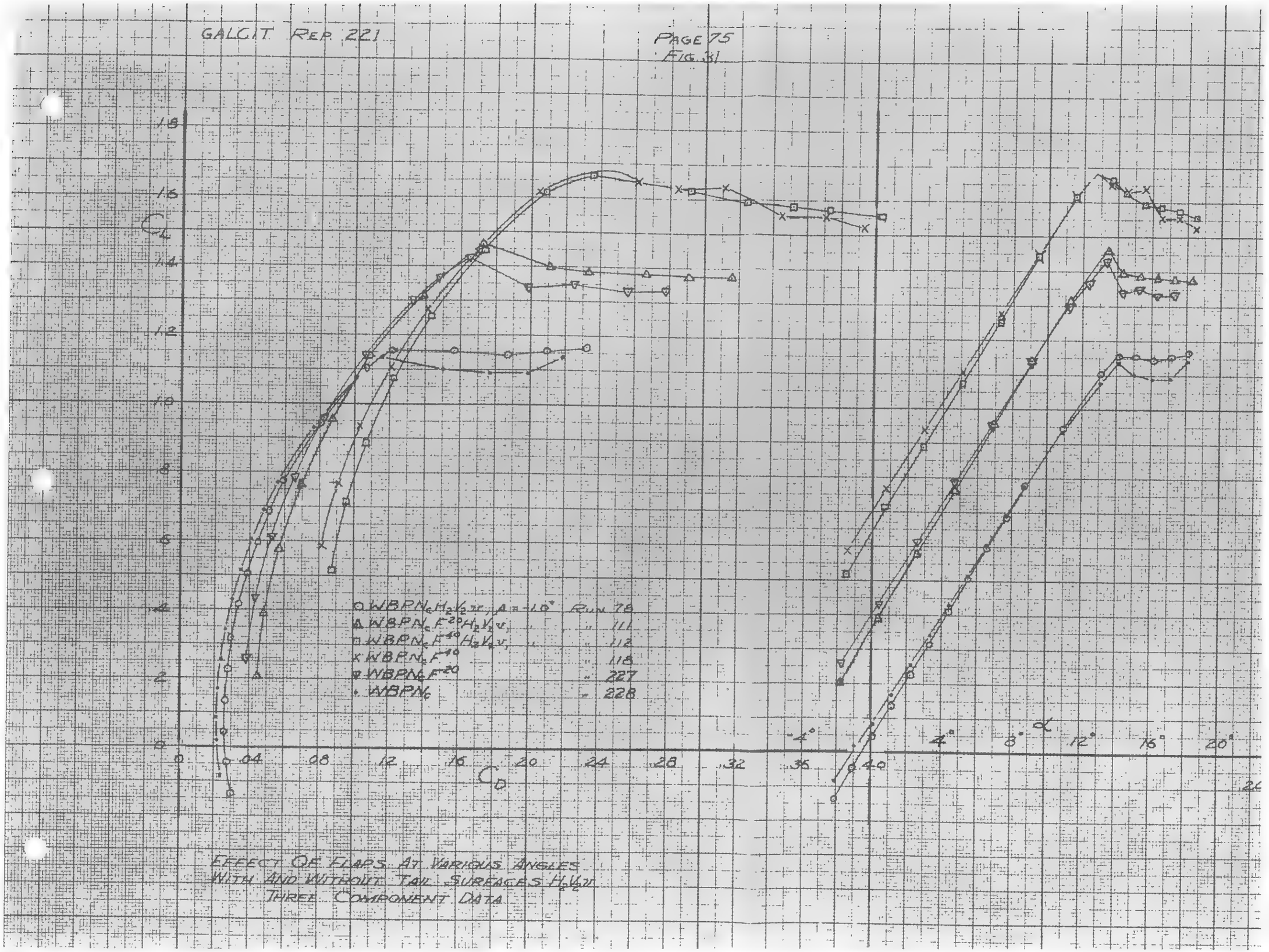
EFFECT OF VARIOUS COMPONENTS WITH B_2 HULL

THREE COMPONENT DATA

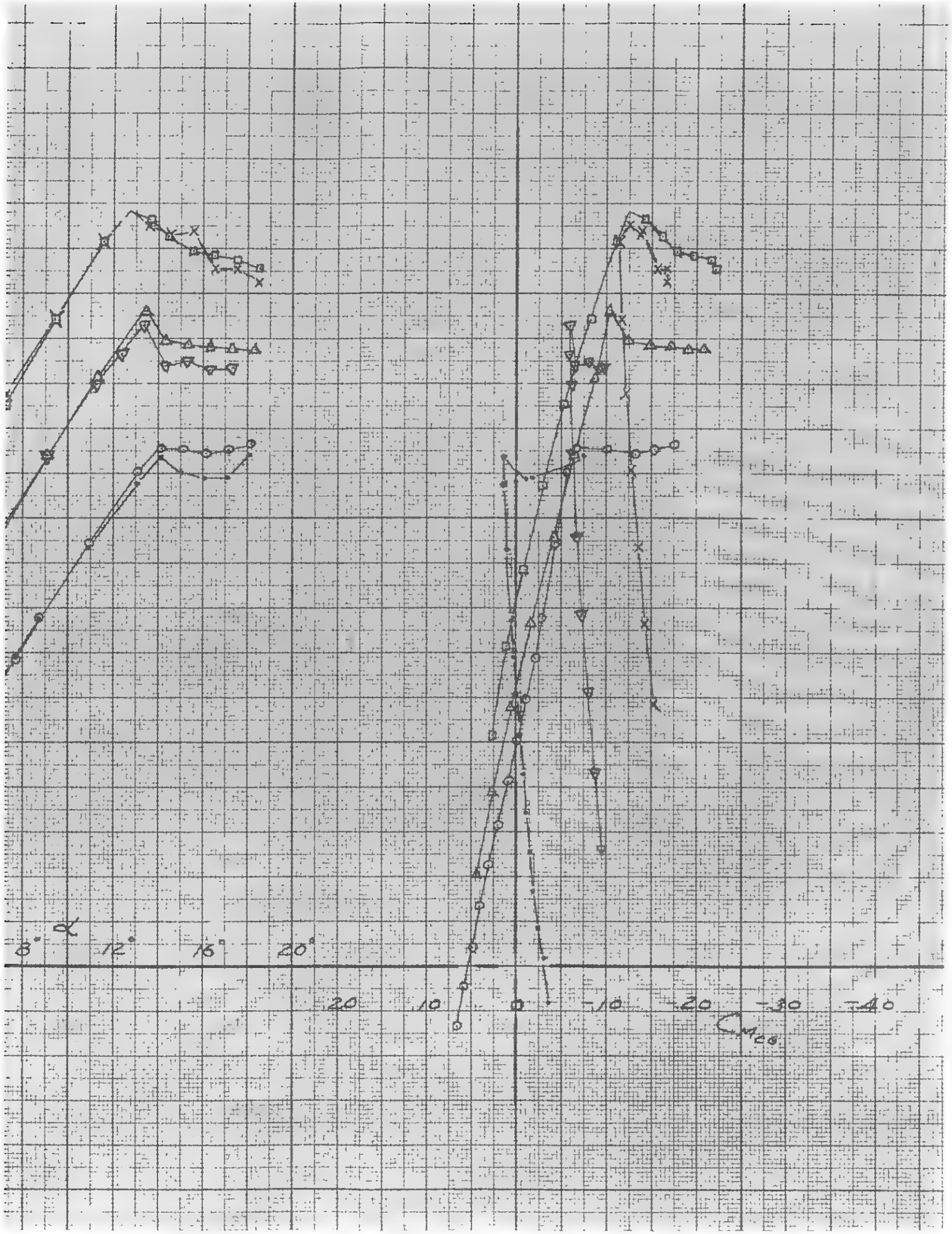

8°
12°
16°
.10
0
-.10
-.20
C_M

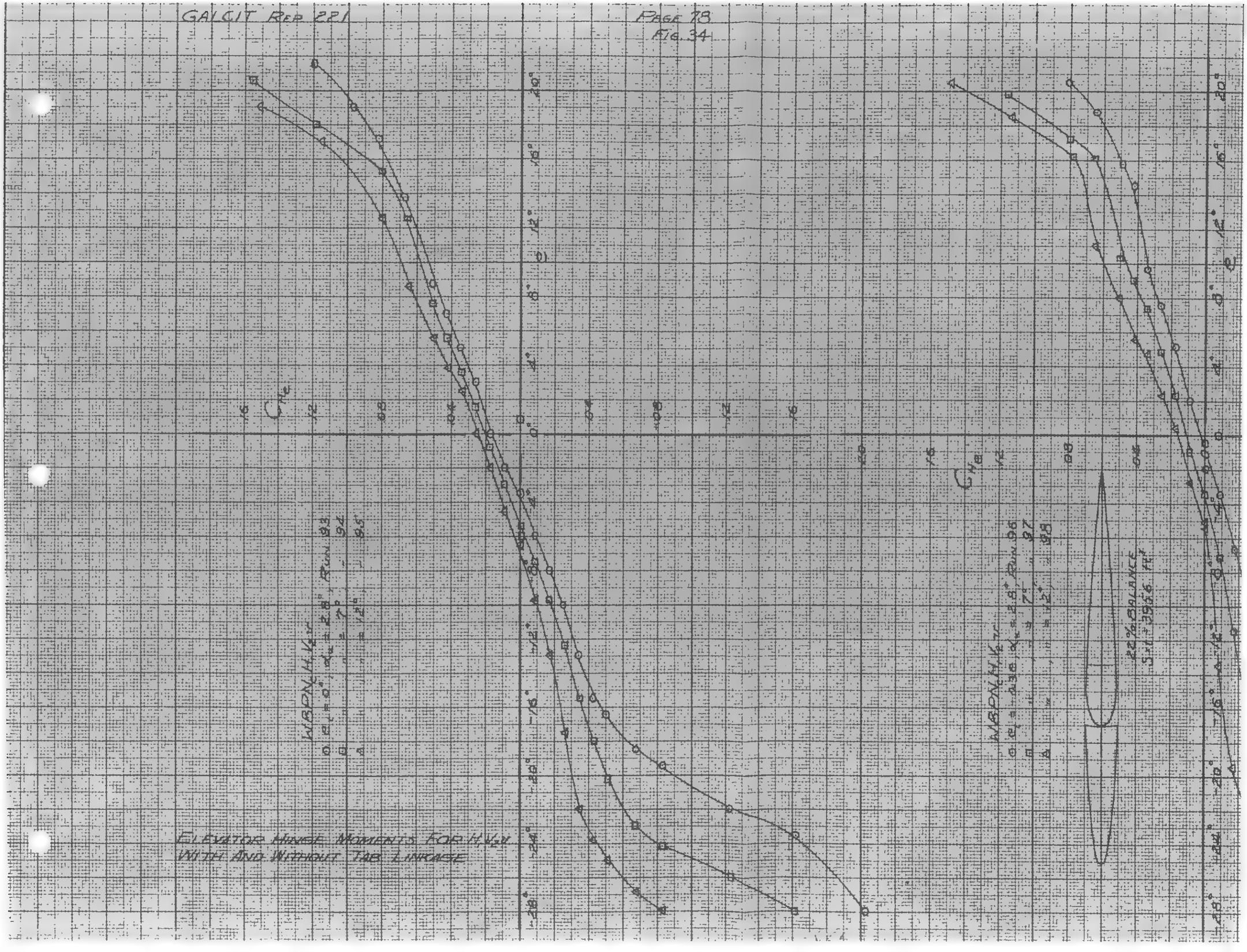


EFFECT OF VARIOUS COMPONENTS - PARASITE DRAG

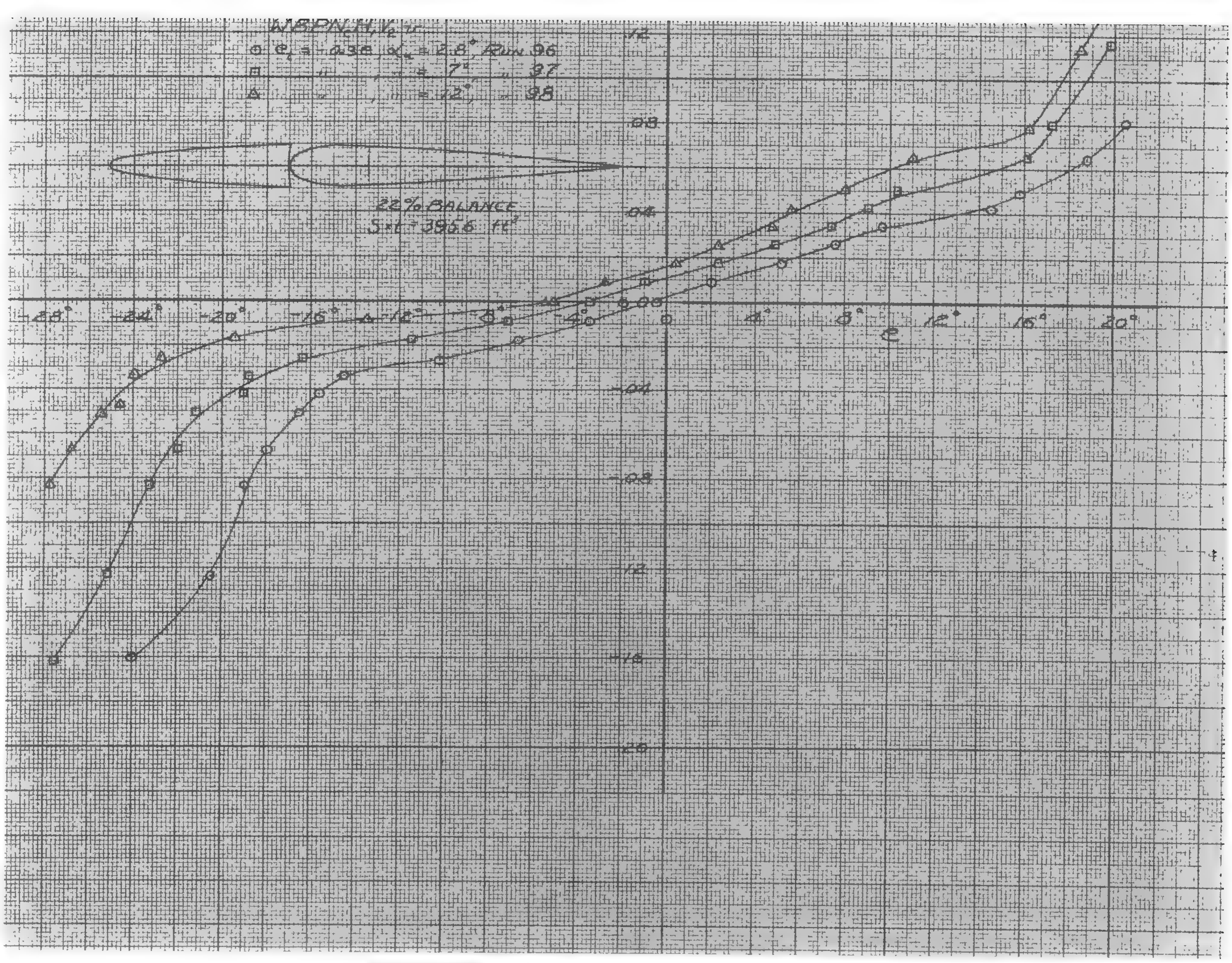


EFFECT OF FLAPS AT VARIOUS ANGLES WITH AND WITHOUT TAIL SURFACES H_2V_2
THREE COMPONENT DATA

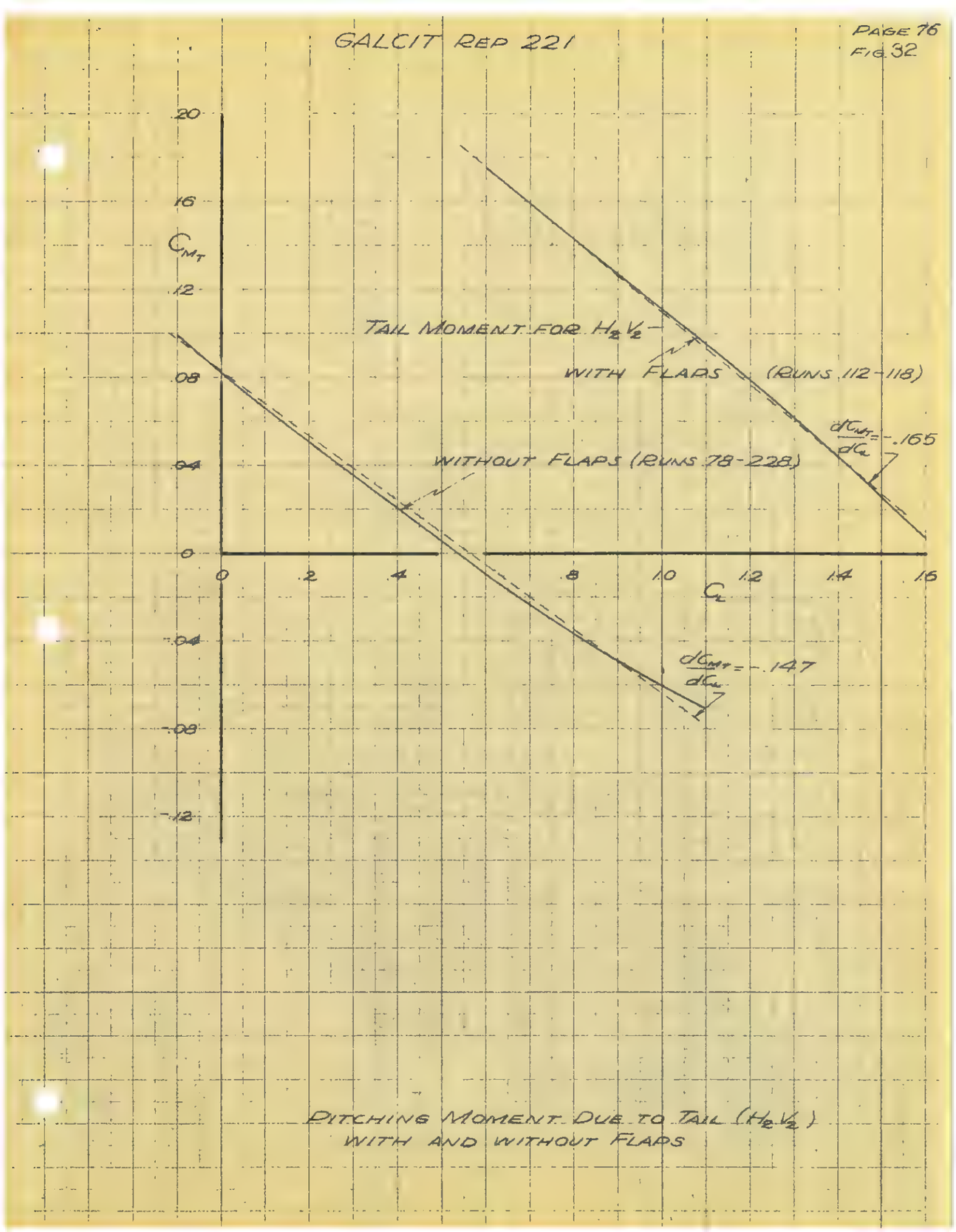

8°
α
12°
16°
20°
20
10
0
-10
-20
-30
-40
$C_{M_{CG}}$



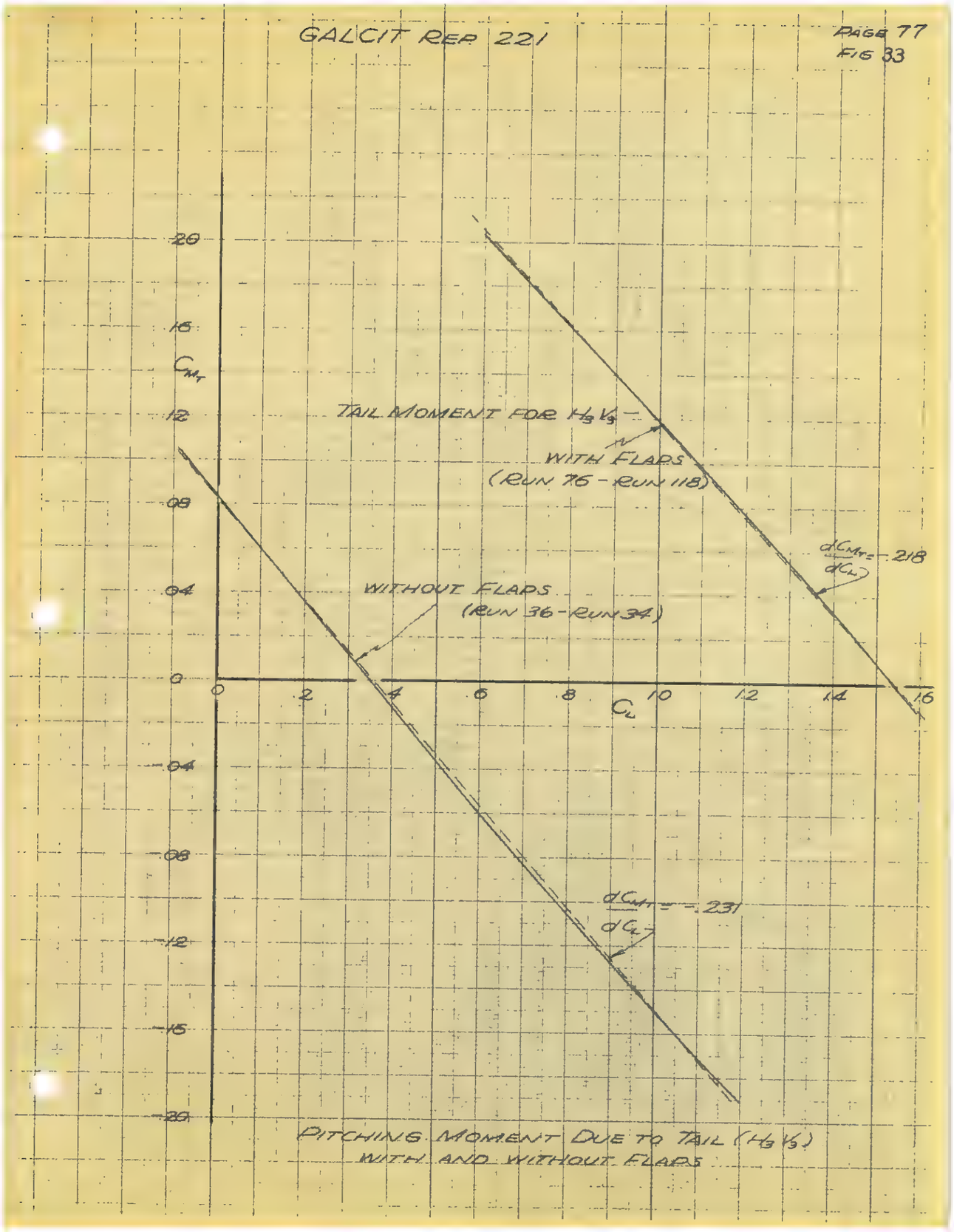
Elevator Hinge Moments for Wasp Wing With and Without Tab Linkage



W.B.P.N.H.V.2 Tr.
○ e_1 = 0.36 α_a = 2.8° Run 96
□ " , " = 7° " 97
△ " , " = 12° " 98
22% BALANCE
S×t = 39.56 ft³
e



PITCHING MOMENT DUE TO TAIL ($H_2 V_2$)
WITH AND WITHOUT FLAPS



PITCHING MOMENT DUE TO TAIL ($H_3 V_3$)
WITH AND WITHOUT FLAPS

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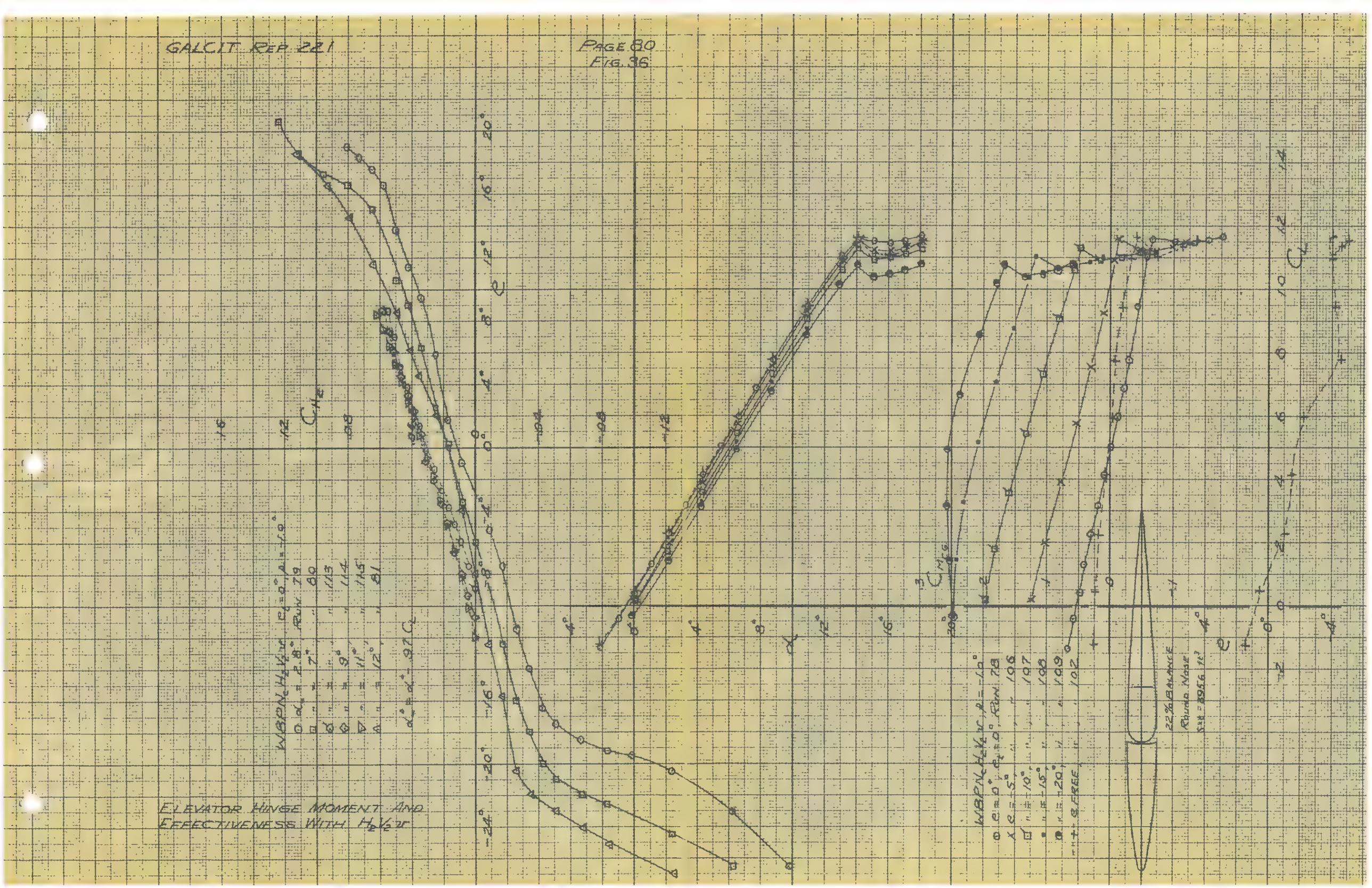
FIG 35

RUN
78
89
90
91
92

$C_{M_{c.g.}}$

C_L

ELEVATOR-FREE STABILITY WITH H_1V_2 OR WITH VARIOUS TAB SETTINGS



ELEVATOR HINGE MOMENT AND EFFECTIVENESS WITH H_2V_2

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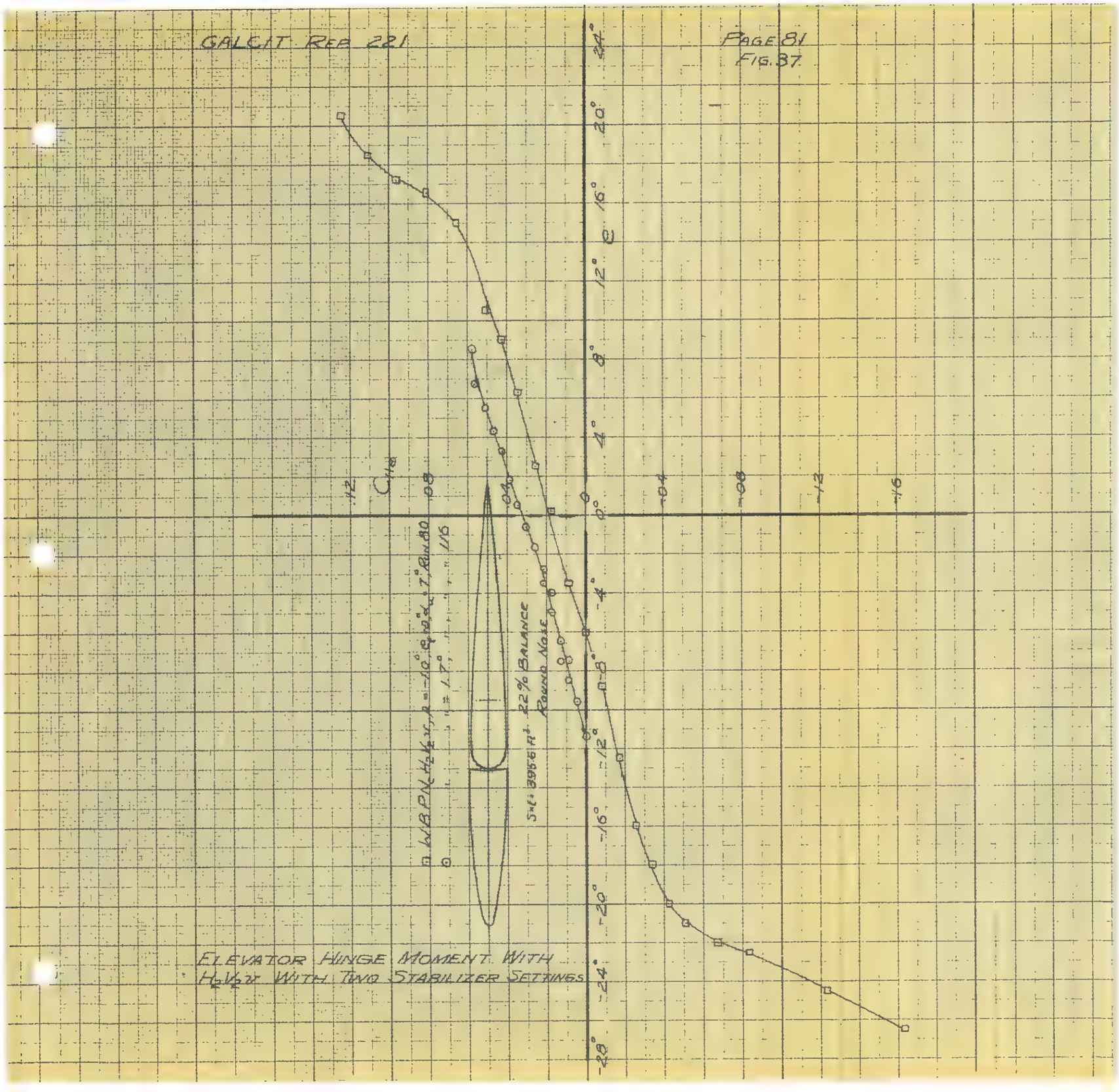
FIG. 37



ELEVATOR HINGE MOMENT WITH H_2V_2T WITH TWO STABILIZER SETTINGS

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ELEVATOR HINGE MOMENT WITH H_2 FULL WITH SUBSTREAM SIMULATED

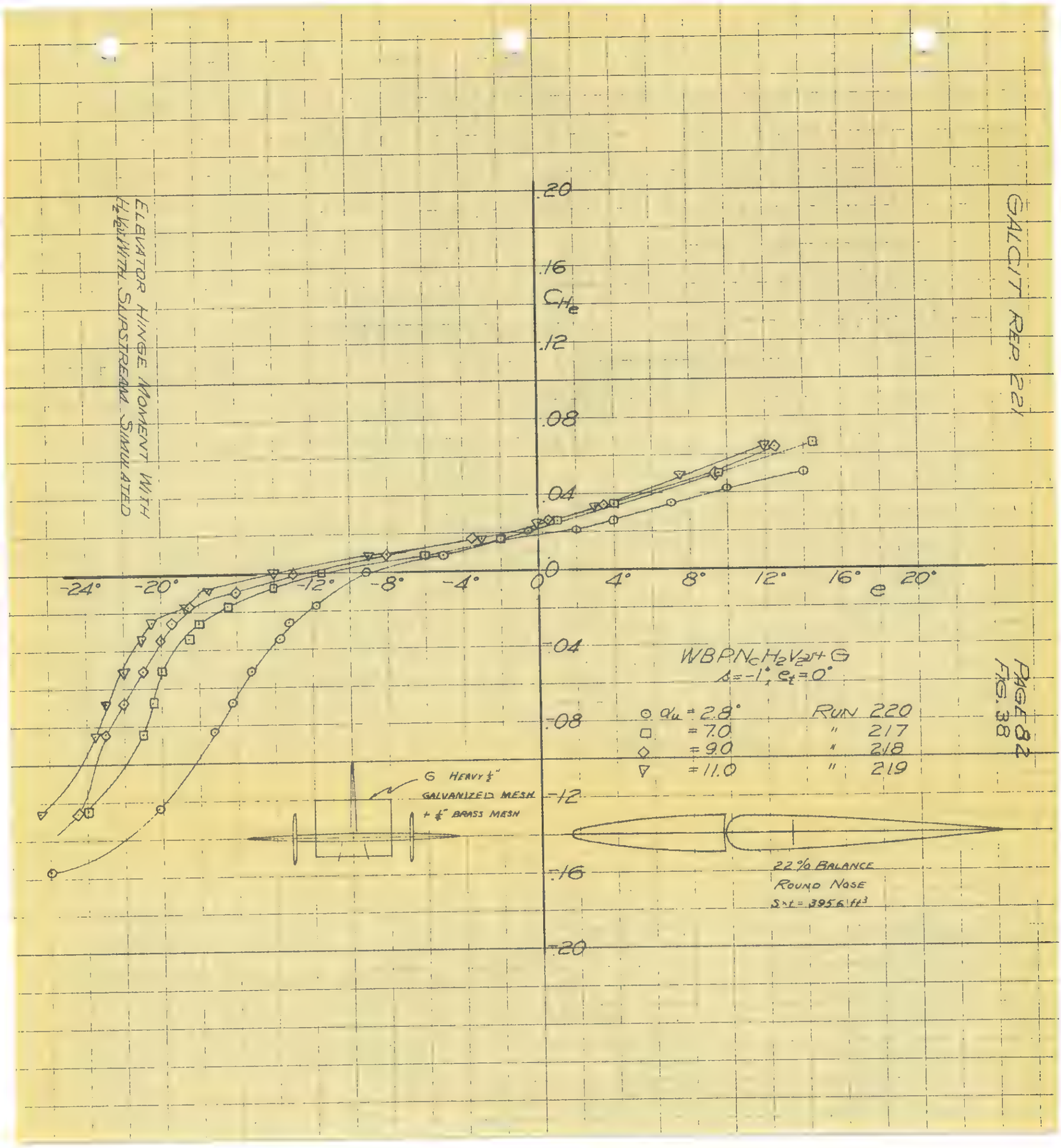

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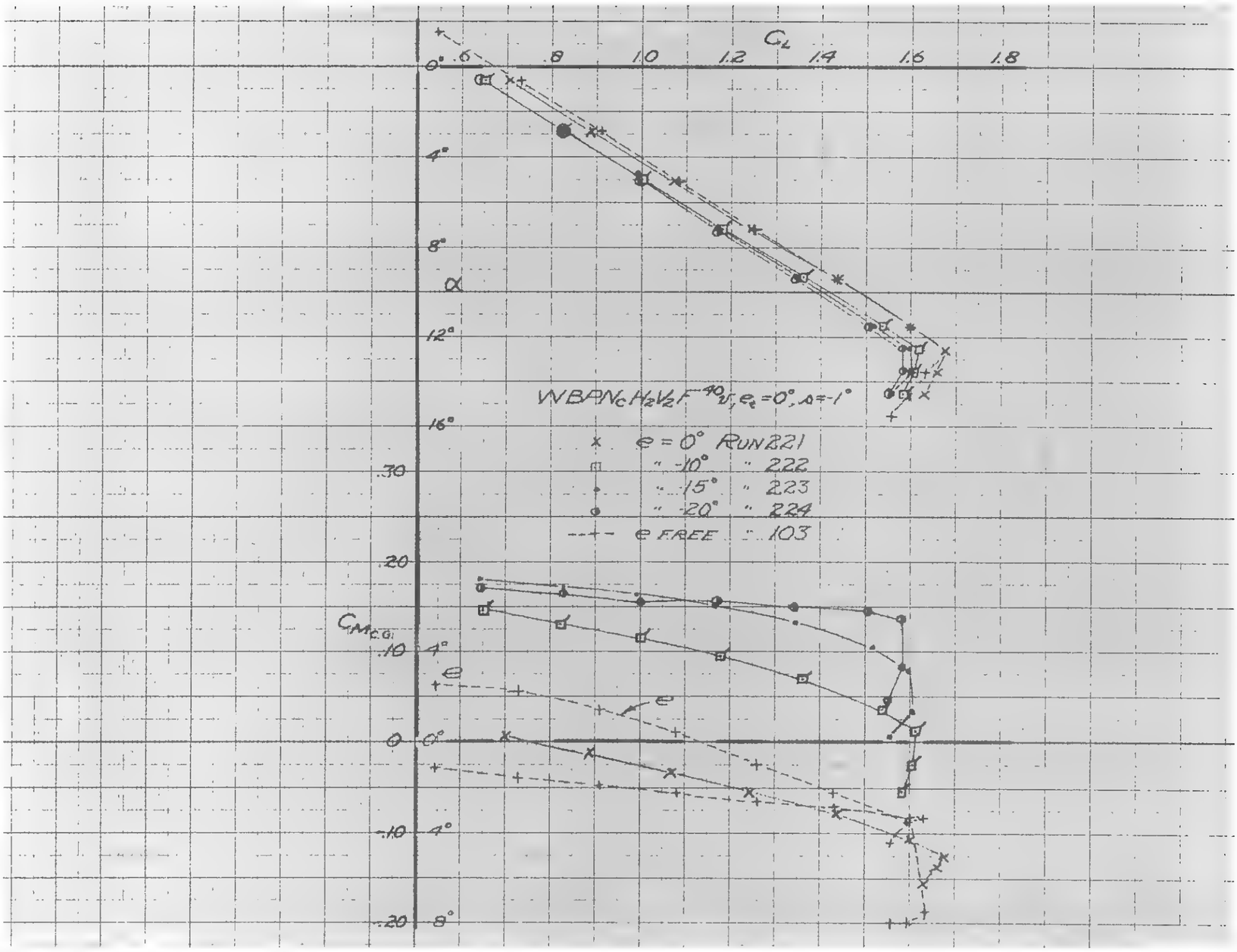
FIG. 38

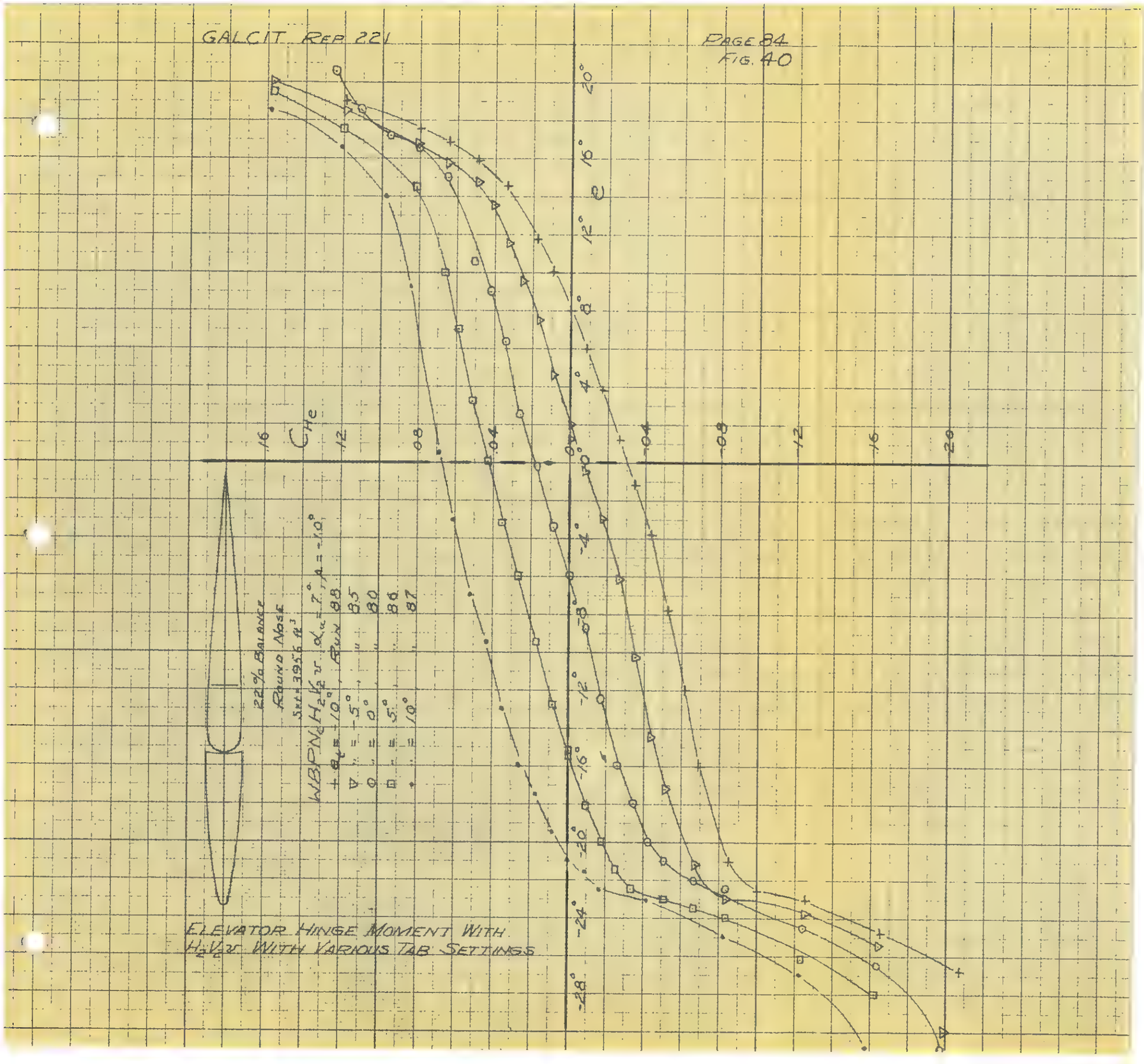

C_L
.6
.8
1.0
1.2
1.4
1.6
1.8
0°
4°
8°
α
12°
16°
WBAN$_c$H$_2$V$_2$F $^{40}_{0}$, e_t=0°, Δ=-1°
× e = 0° RUN 221
□ " -10° " 222
• " -15° " 223
○ " -20° " 224
--+-- e FREE " 103
.30
.20
.10
0
-.10
-.20
$C_{M_{c.g.}}$
4°
e
0°
4°
8°

WBPNc-H2V2F-40 C_{H_e}, ϵ_t=0°, δ=-1°

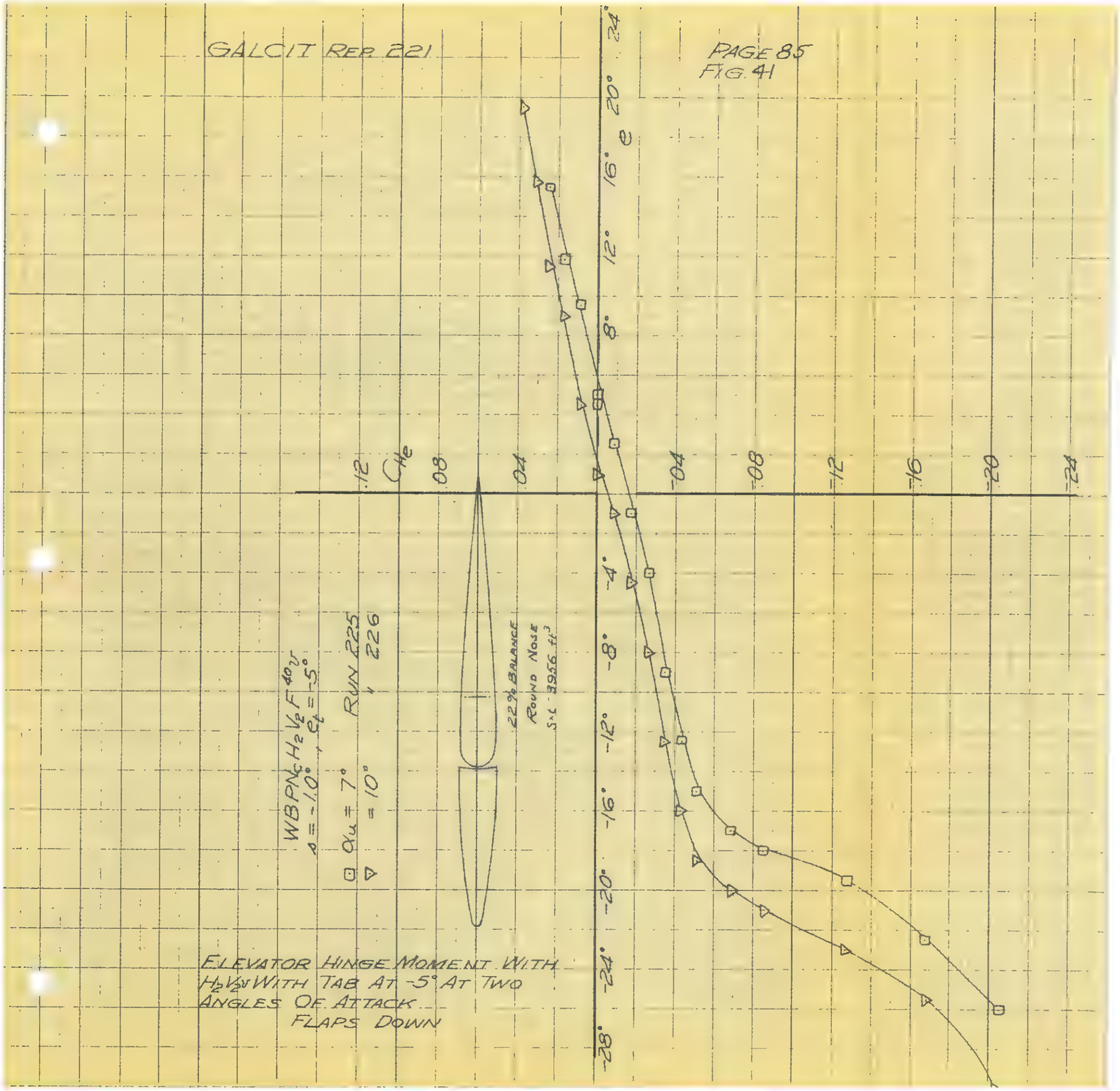
Δ α_u = 2.8° RUN 84
□ 7° 83
○ 12° 82
◇ $\alpha_u \doteq \alpha - .97 C_L$

22% BALANCE
ROUND NOSE
S_{H_e} = 3956 ft²

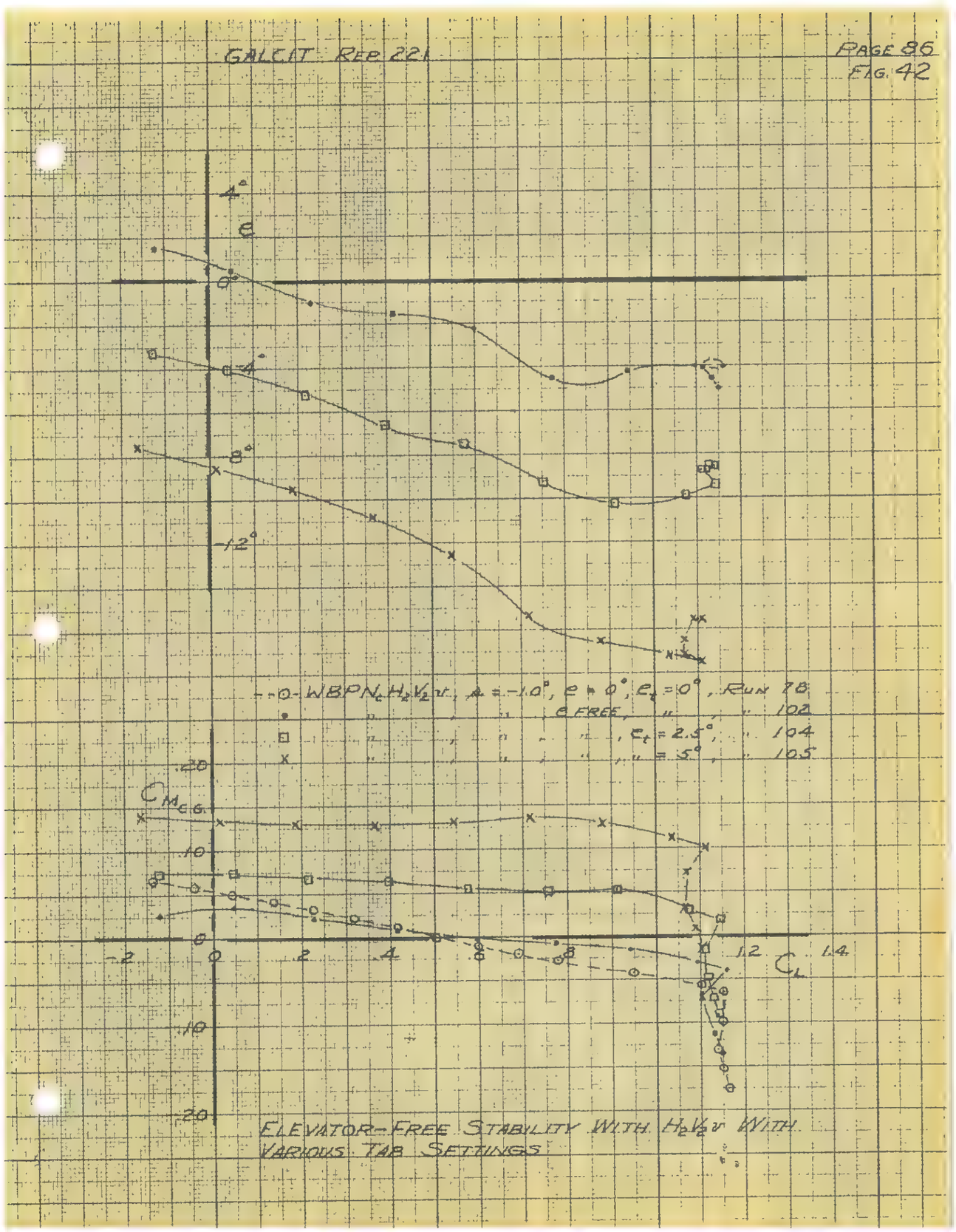
ELEVATOR HINGE MOMENT & EFFECTIVENESS WITH H_2V_2v FLAPS DOWN

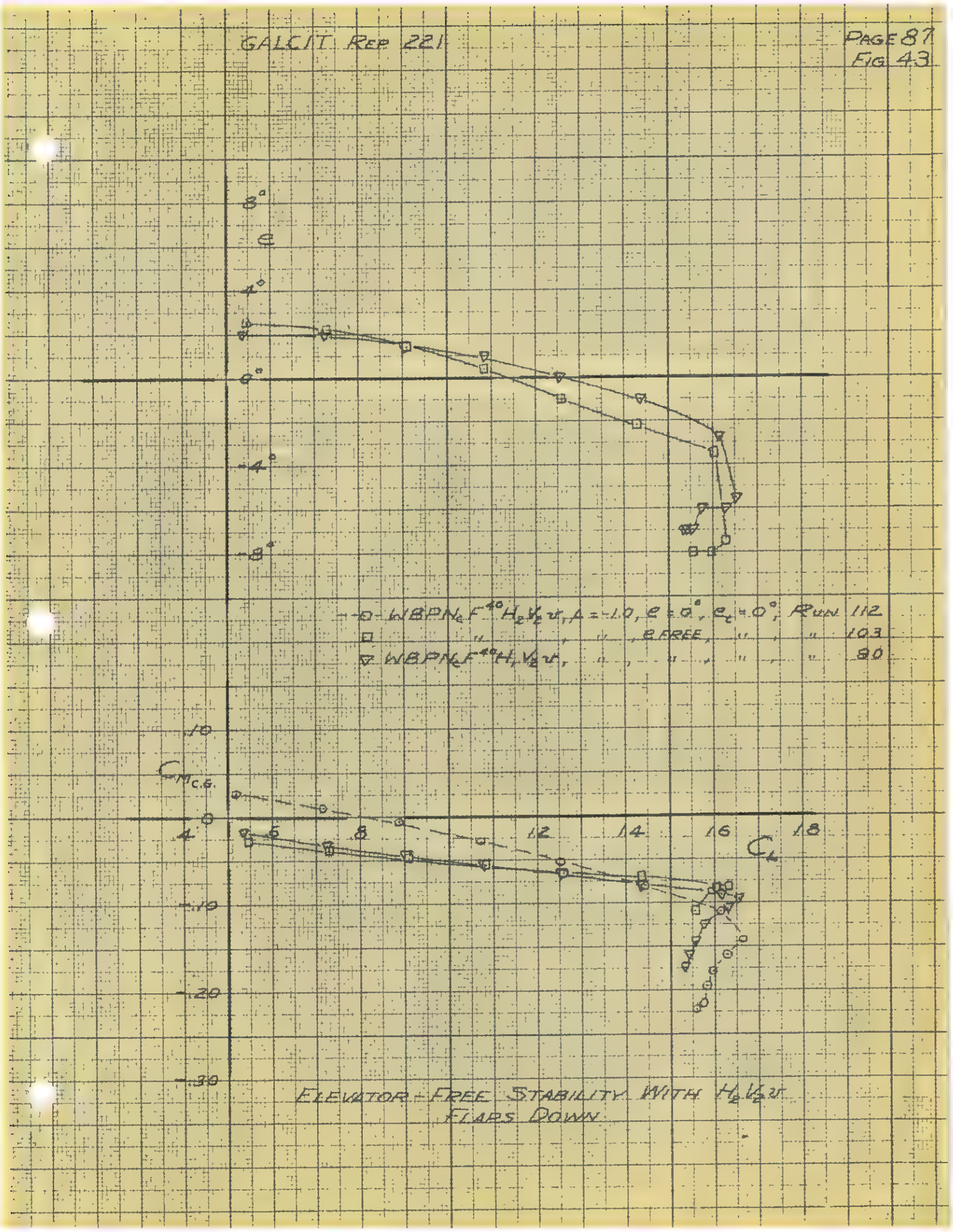


ELEVATOR HINGE MOMENT WITH H_2V_2r WITH VARIOUS TAB SETTINGS

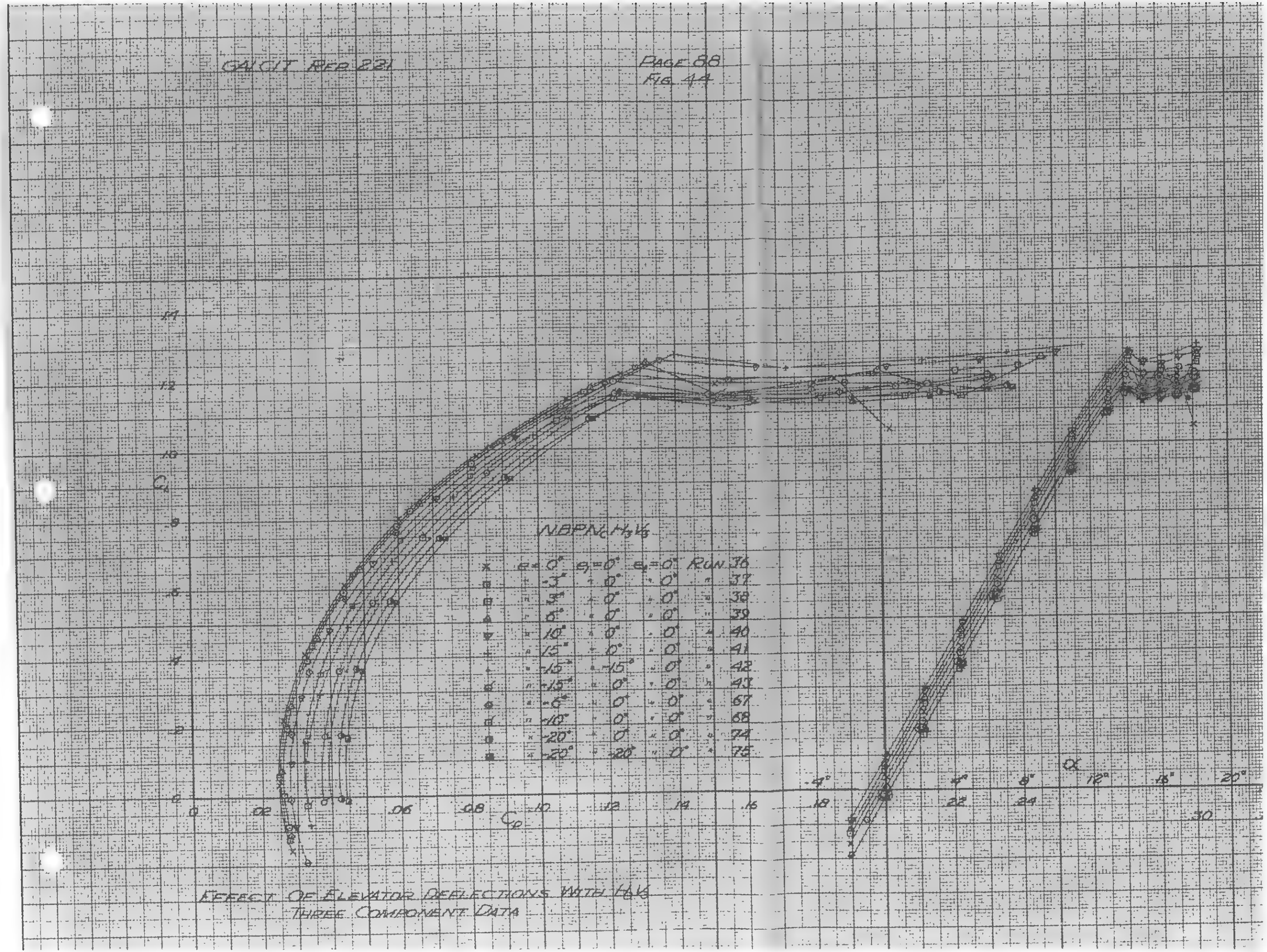


ELEVATOR HINGE MOMENT WITH H_2V_2 WITH TAB AT -5° AT TWO ANGLES OF ATTACK
FLAPS DOWN

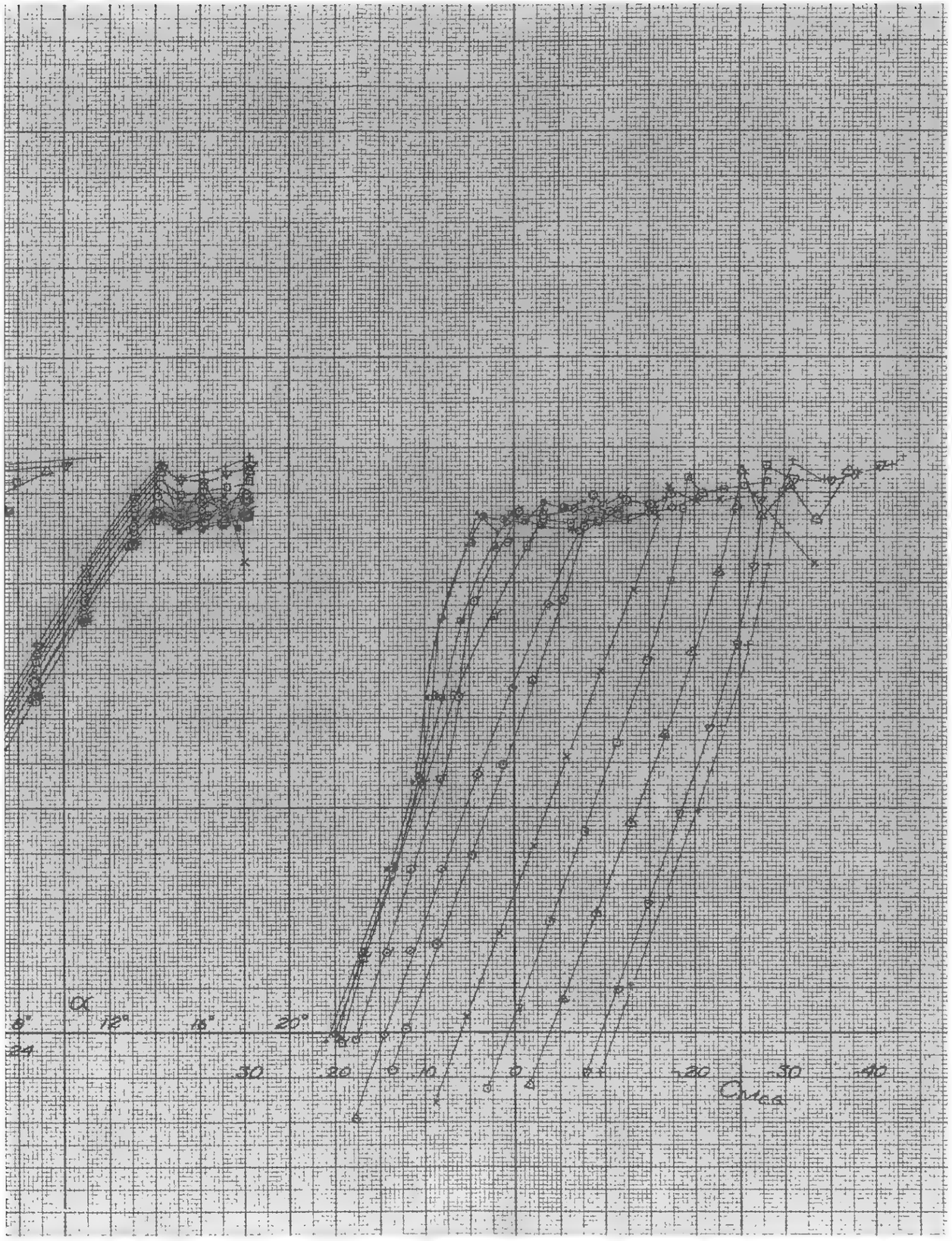

i_t
4°
0°
-4°
-8°
-12°
-○- WBPN_c H_2 V_2 tr, i_t = -1.0°, ε = 0°, ε_t = 0°, Run 78
ε FREE, " " 102
" " " , ε_t = 2.5°, " 104
" " " " = 5°, " 105
C_M c.g.
.20
.10
0
.10
.20
-2
0
2
4
.8
1.2
1.4
C_L
ELEVATOR-FREE STABILITY WITH H_2 V_2 tr WITH VARIOUS TAB SETTINGS



ELEVATOR-FREE STABILITY WITH $H_2V_2t_v$
FLAPS DOWN.



EFFECT OF ELEVATOR DEFLECTIONS WITH H46
THREE COMPONENT DATA


α
8°
12°
16°
20°
24
30
-20
-10
0
10
20
30
40
$C_{M_{c/4}}$

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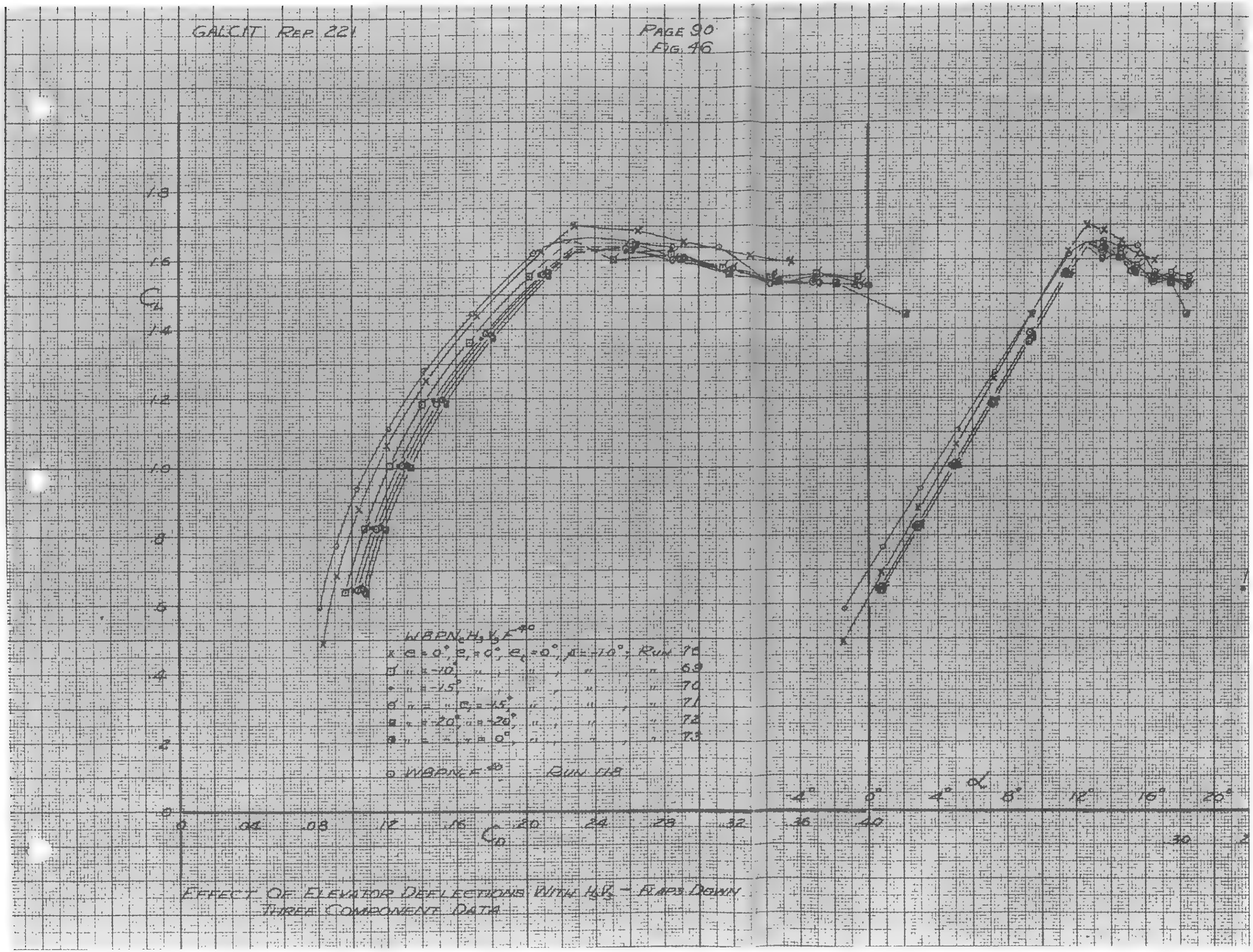
WBPN½ H_3 V_3 $i_t = -1°$

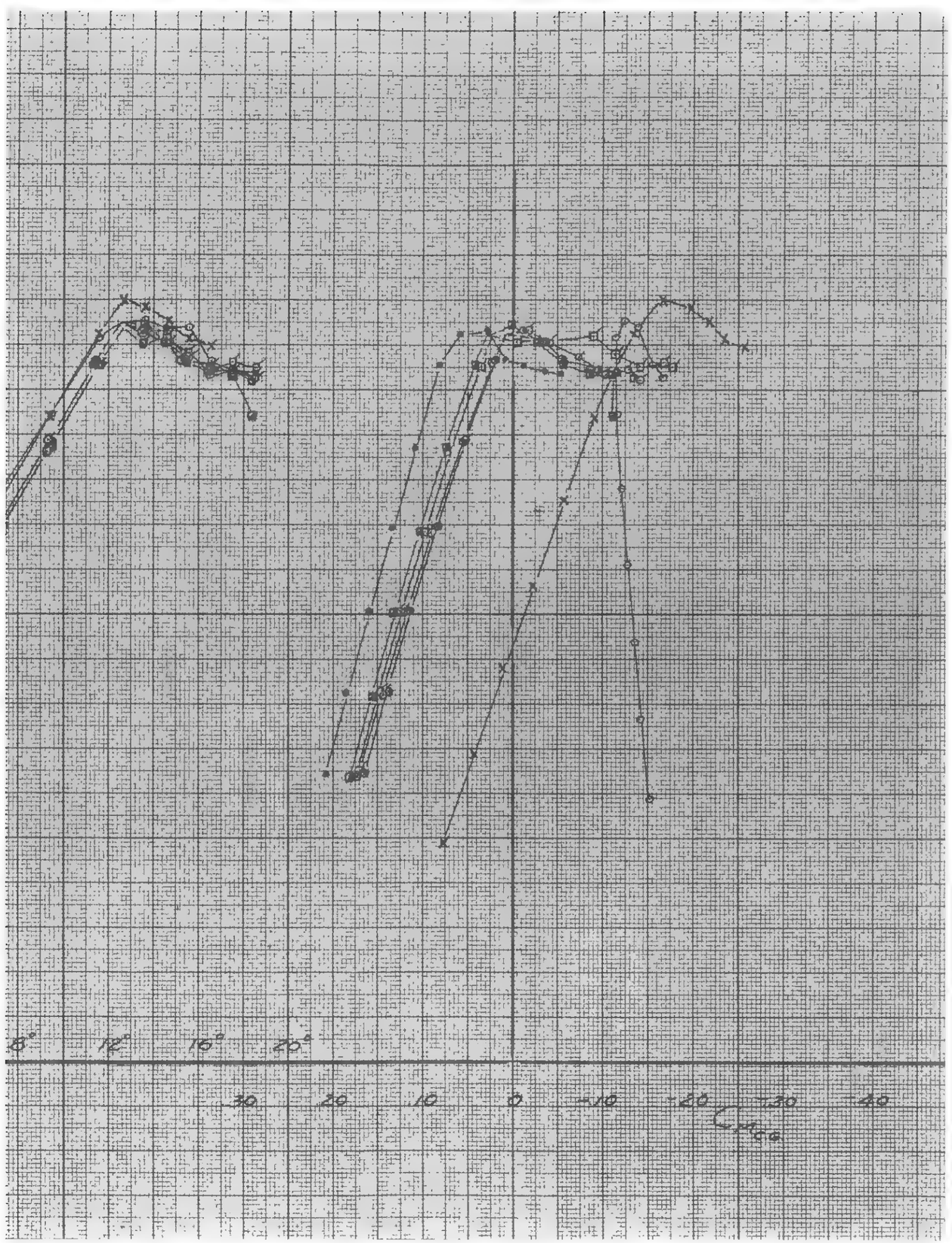
×	$e = e_t = 0$	$e = 0$	Run 36
○	" "	$e = -5°$	37
□	" "	$e = -9$	38
△	" "	$e = -15$	39
▽	" "	$e = -10$	40
+	" "	$e = +15$	41
·	$e = -15°$ $e_t = 0$	$e = -15$	42
⊘	$e = e_t = 0$	$e = -15$	43
◇	" "	$e = -6$	67
⊞	" "	$e = -10$	68

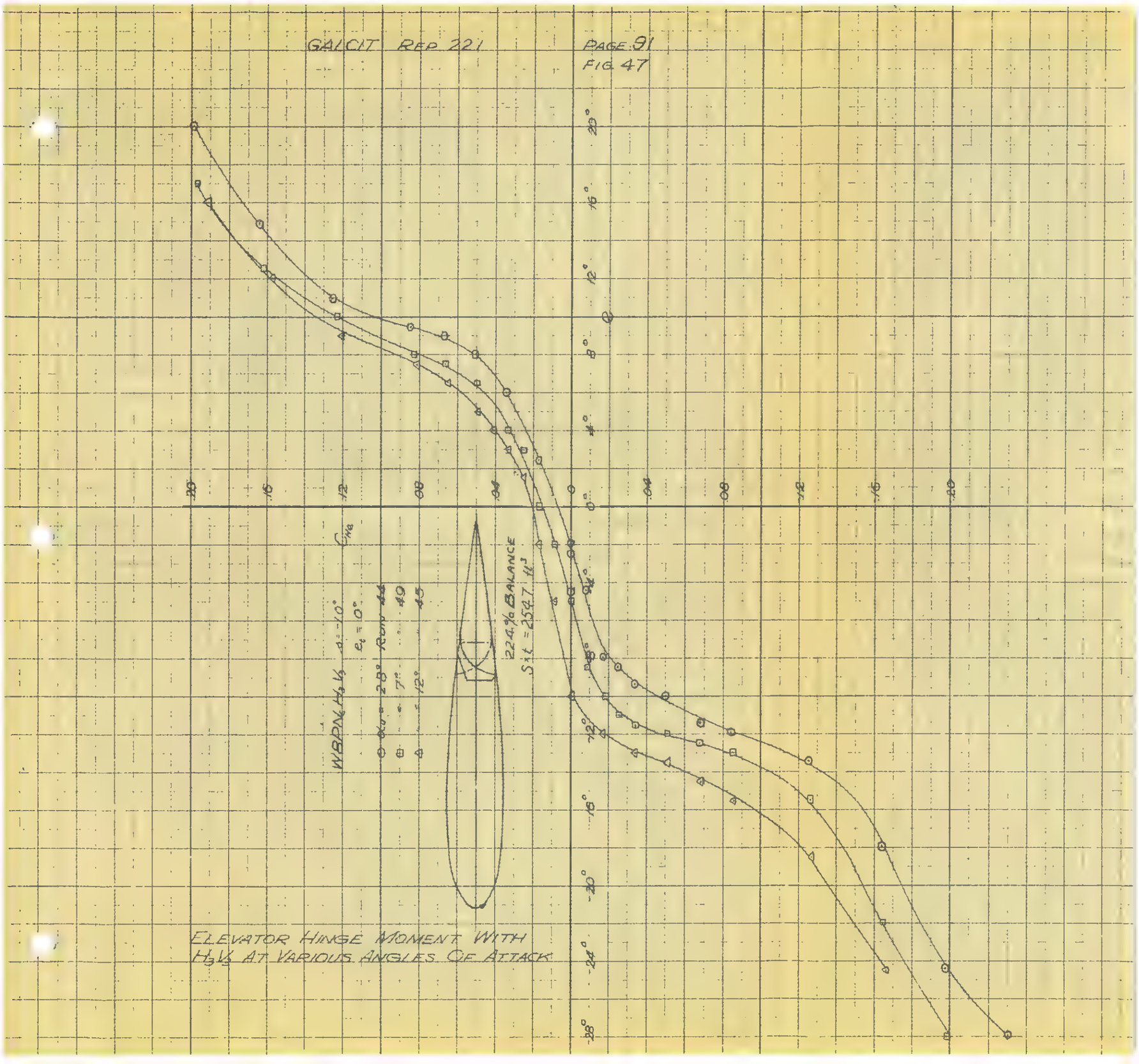
.045
.040
.035
.030
.025
C_{D_p}
-1 0 1 2 3 4 5 C_L 6 7 8

EFFECT OF ELEVATOR DEFLECTIONS WITH H_3V_3
PARASITE DRAG



EFFECT OF ELEVATOR DEFLECTIONS WITH H$_3$ - FLAPS DOWN
THREE COMPONENT DATA


8°
12°
16°
20°
-30
-20
-10
0
-10
-20
-30
-40
$C_{x_{cg}}$



ELEVATOR HINGE MOMENT WITH H_3V_3 AT VARIOUS ANGLES OF ATTACK

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Fig 48

EFFECT OF ELEVATOR EXTENSION, FLAPS, AND NACELLES ON ELEVATOR HINGE MOMENT WITH $M_3 V_3$

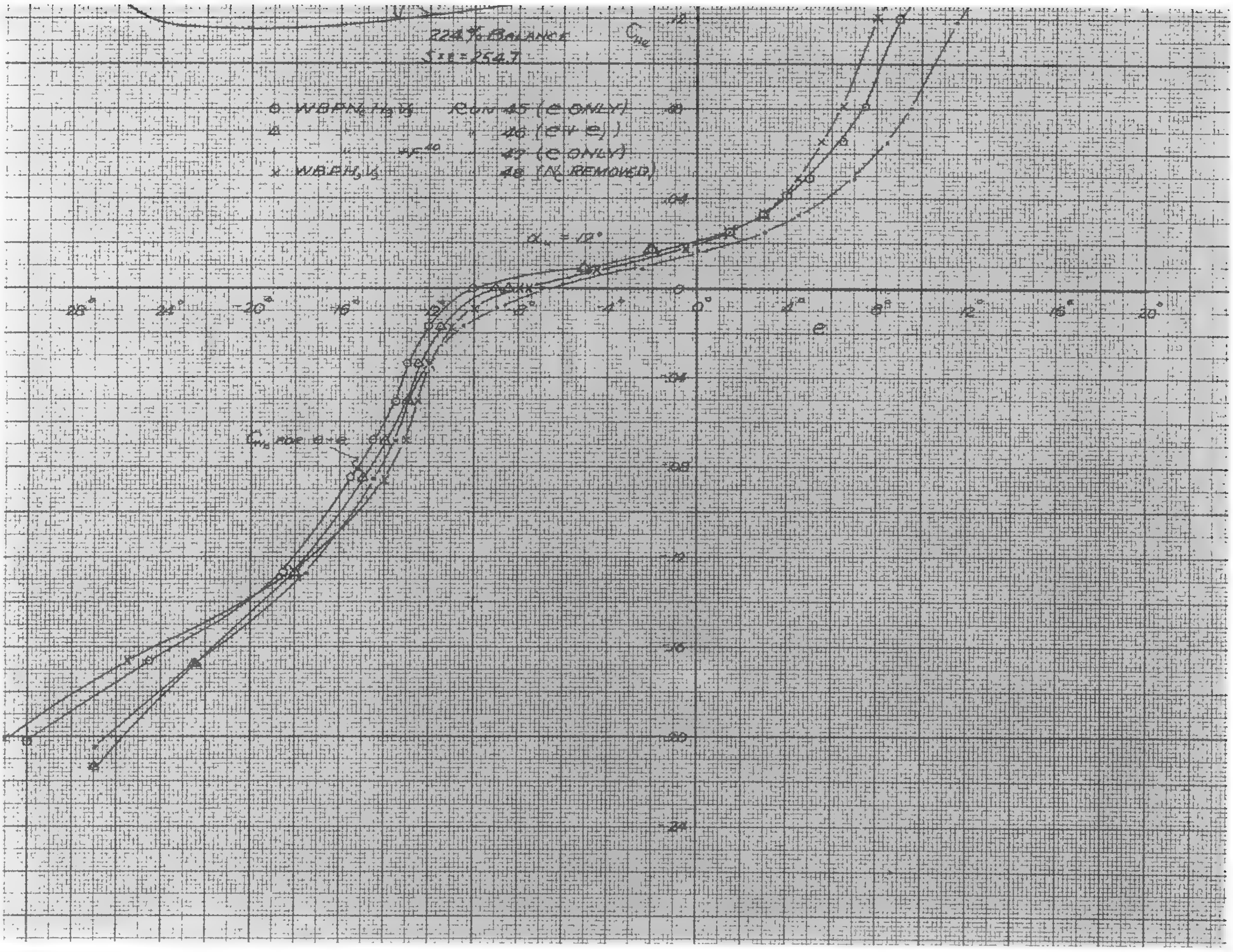
224% BALANCE
S_{IE} = 254.7
o WBPN Run 45 (e ONLY)
Δ 46 (e + e)
47 (e ONLY)
x WBPH 48 (N REMOVED)
α = 12°
C_{he}
e

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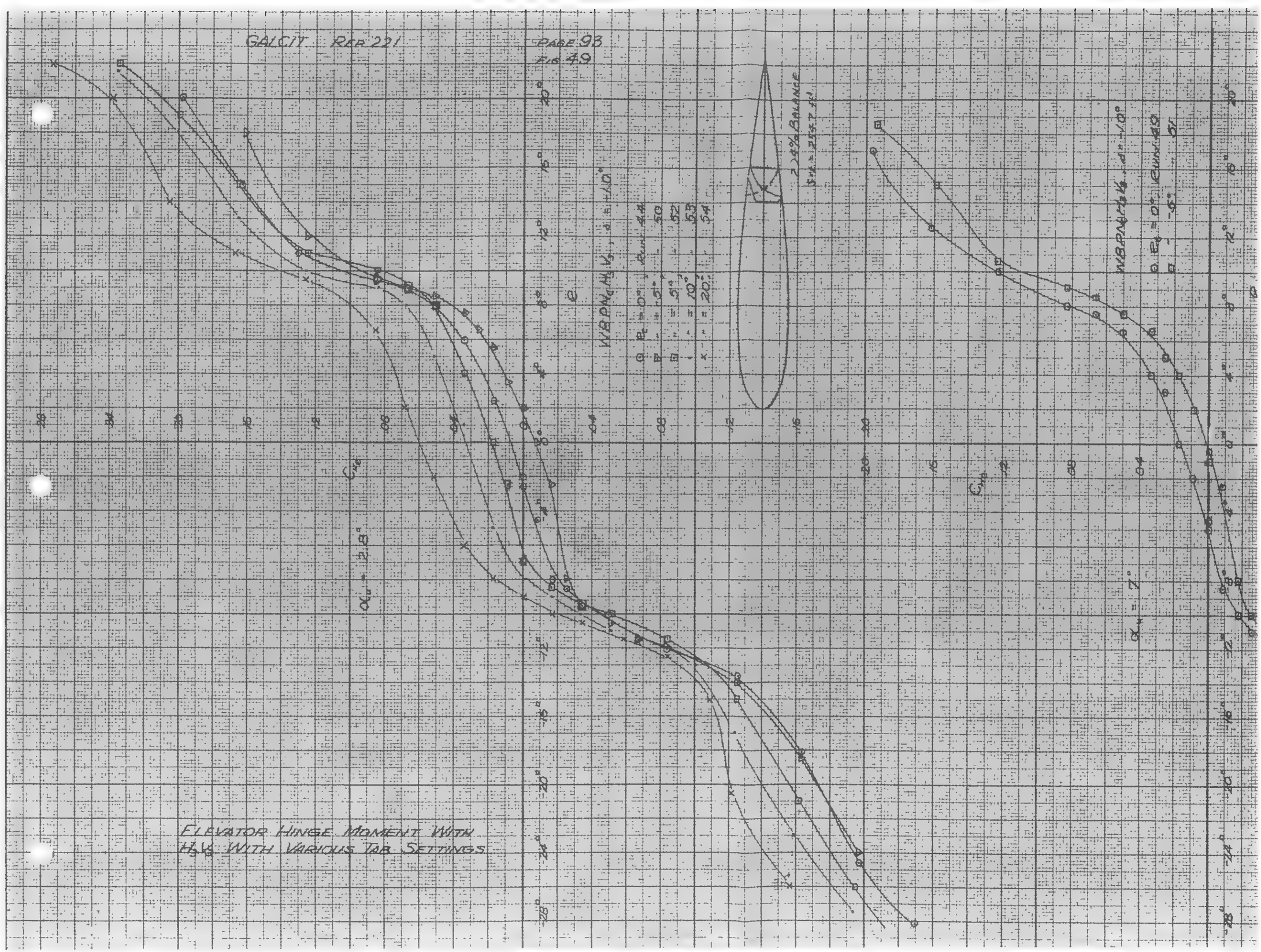
FIG 49



ELEVATOR HINGE MOMENT WITH H_e VS. WITH VARIOUS TAB SETTINGS

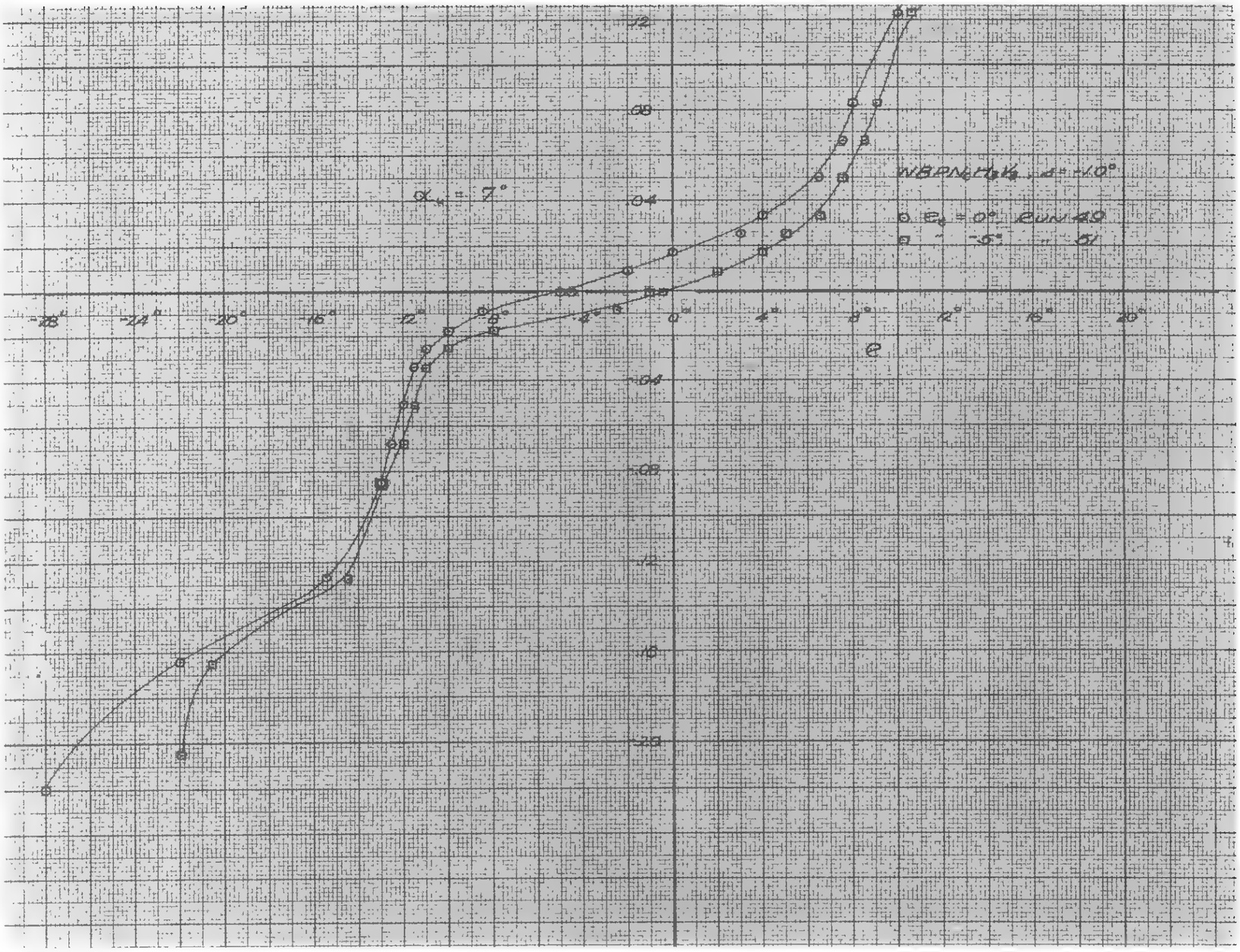
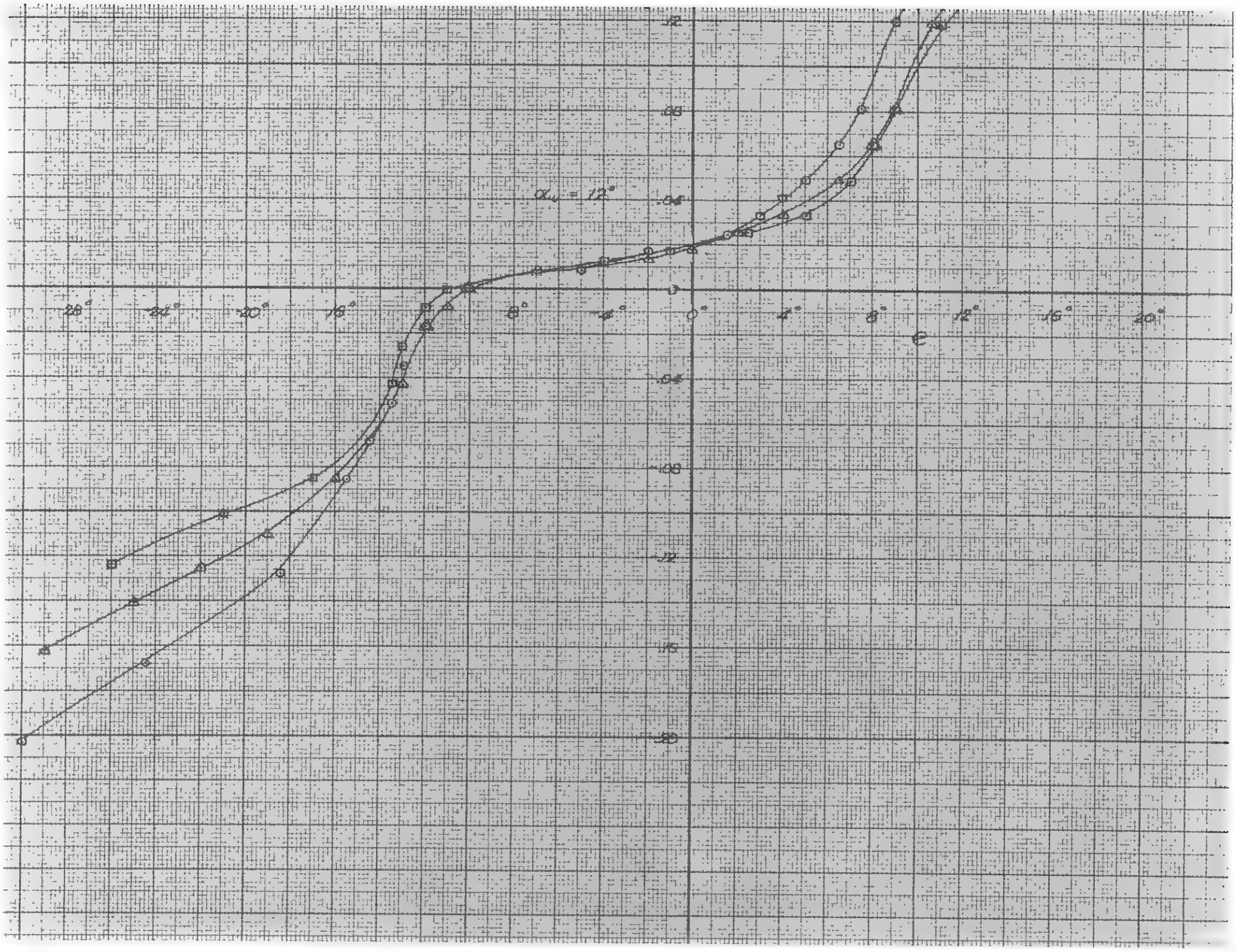
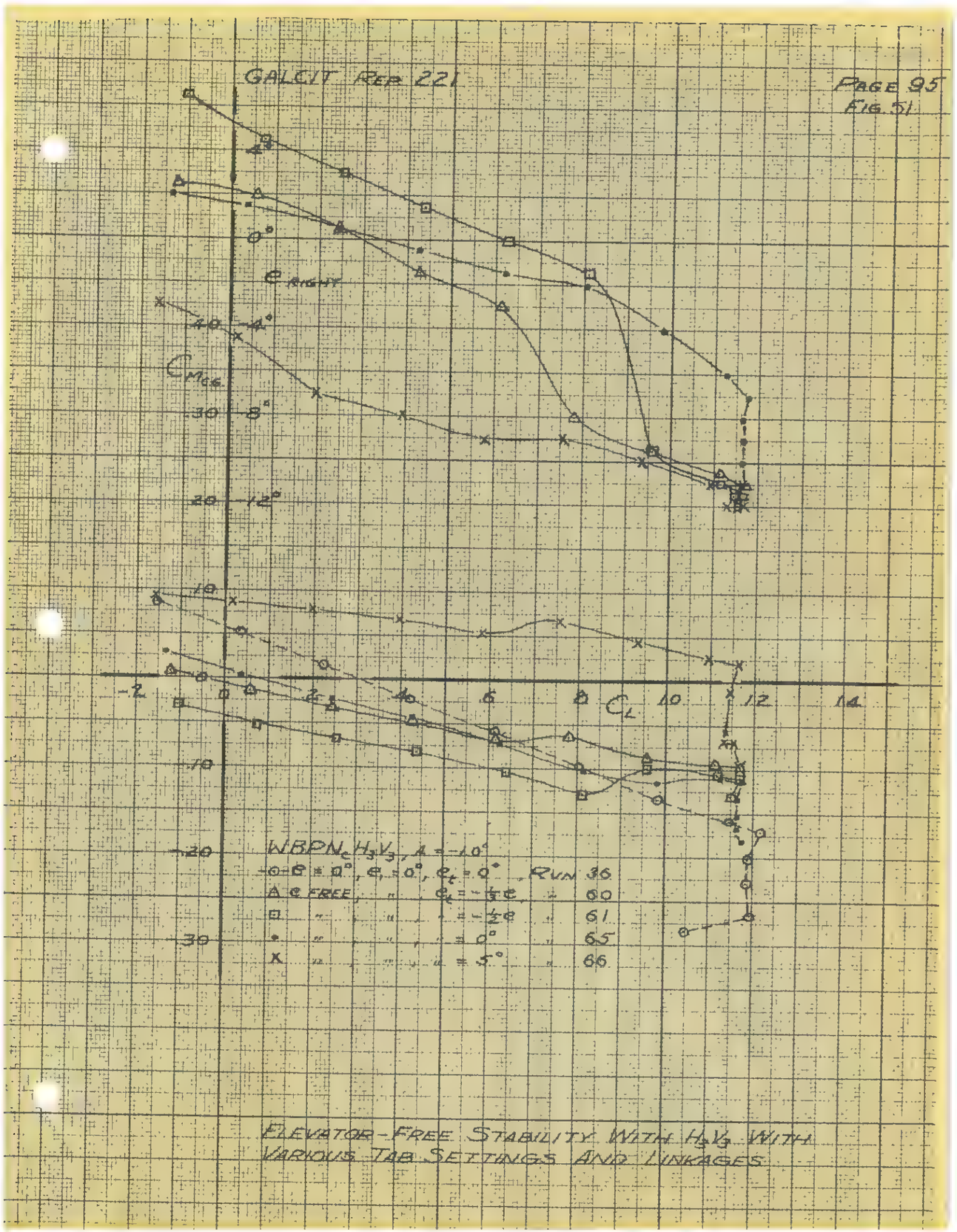

$\alpha_4 = 7°$
$\delta_в = 0°$
$\delta_в = -5°$
-28°
-24°
-20°
-16°
-12°
-8°
-4°
0°
4°
8°
12°
16°
20°
.12
.08
.04
-.04
-.08
-.12
-.16
-.20

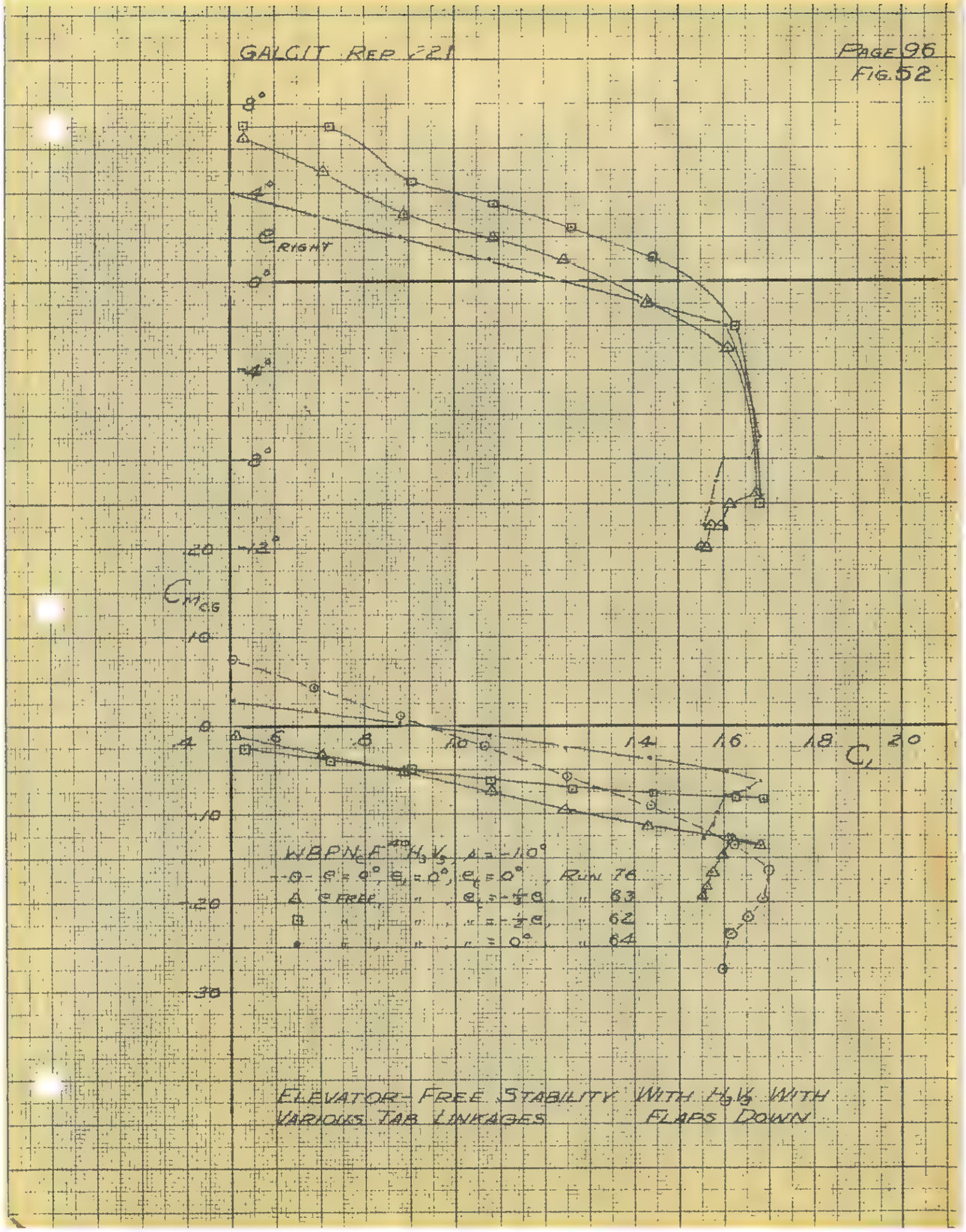
FIG. 50

ELEVATOR HINGE MOMENT WITH TAB WITH VARIOUS TAB LINKAGES


$\alpha_w = 12°$
28°
24°
20°
16°
8°
4°
0°
4°
8°
12°
16°
20°
ϵ
.12
.08
.04
0
-.04
-.08
-.12
-.16
-.20



ELEVATOR-FREE STABILITY WITH H_3V_3 WITH VARIOUS TAB SETTINGS AND LINKAGES



ELEVATOR-FREE STABILITY WITH H_3V_3 WITH VARIOUS TAB LINKAGES FLAPS DOWN

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FIG. 53

ELEVATOR HINGE MOMENT &
EFFECTIVENESS WITH H_e/V_e

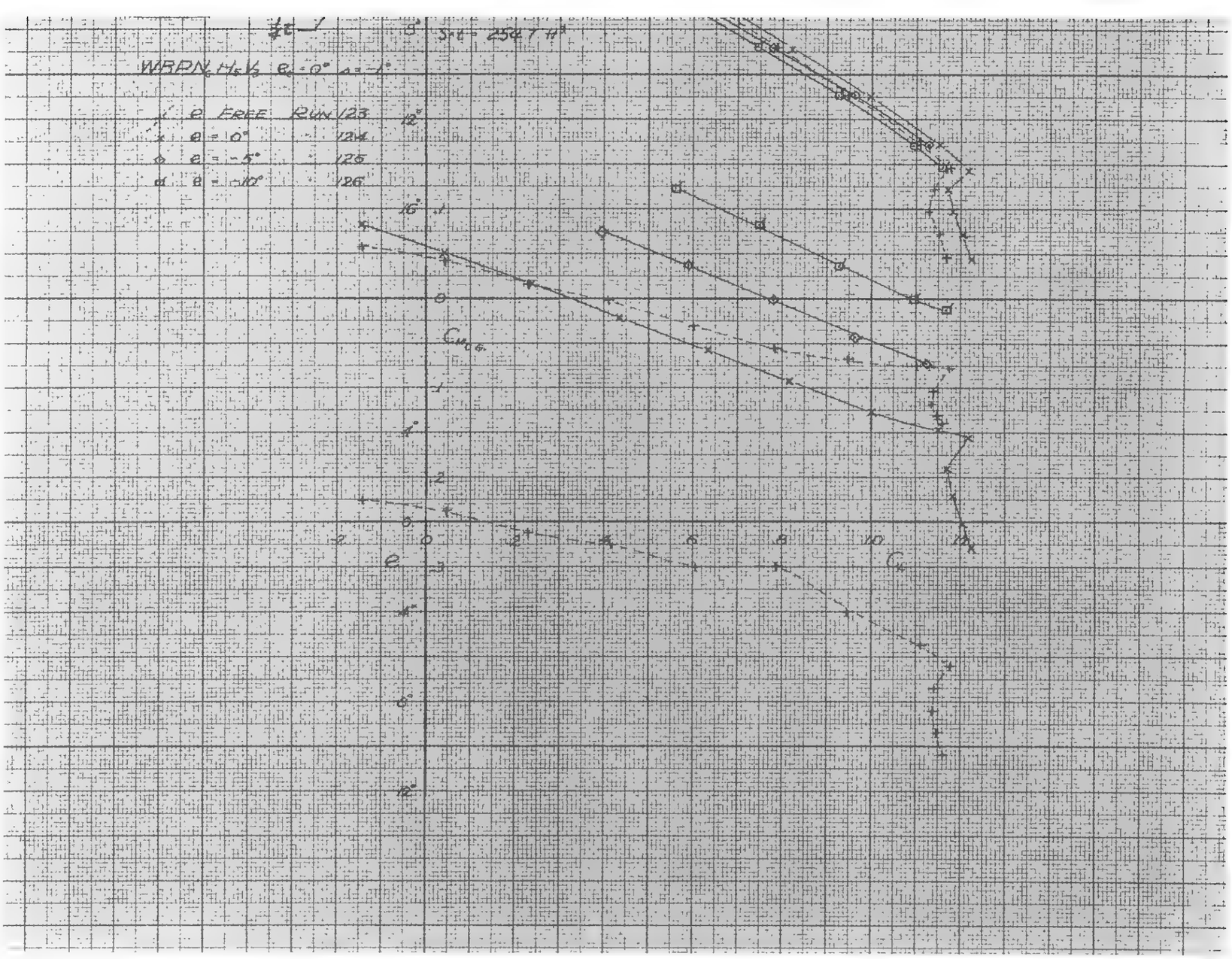
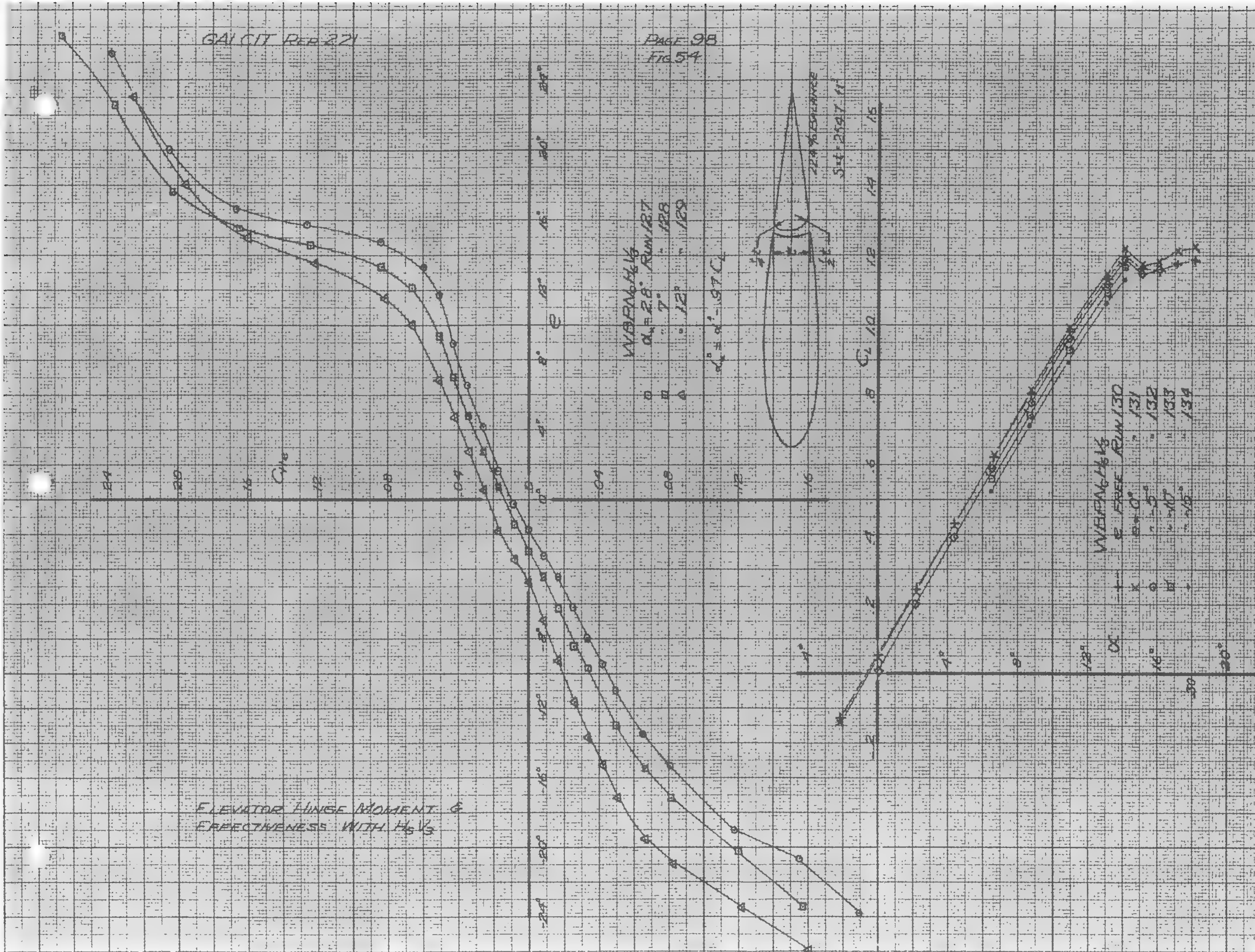

WRDN 1/5 1/3 e_c = 0° i_t = -1°
e FREE RUN 123
e = 10° 124
e = -5° 125
e = -10° 126
$C_{M_{c/4}}$
C_N
e

Fig 54



Elevator Hinge Moment & Effectiveness With H_6V_3

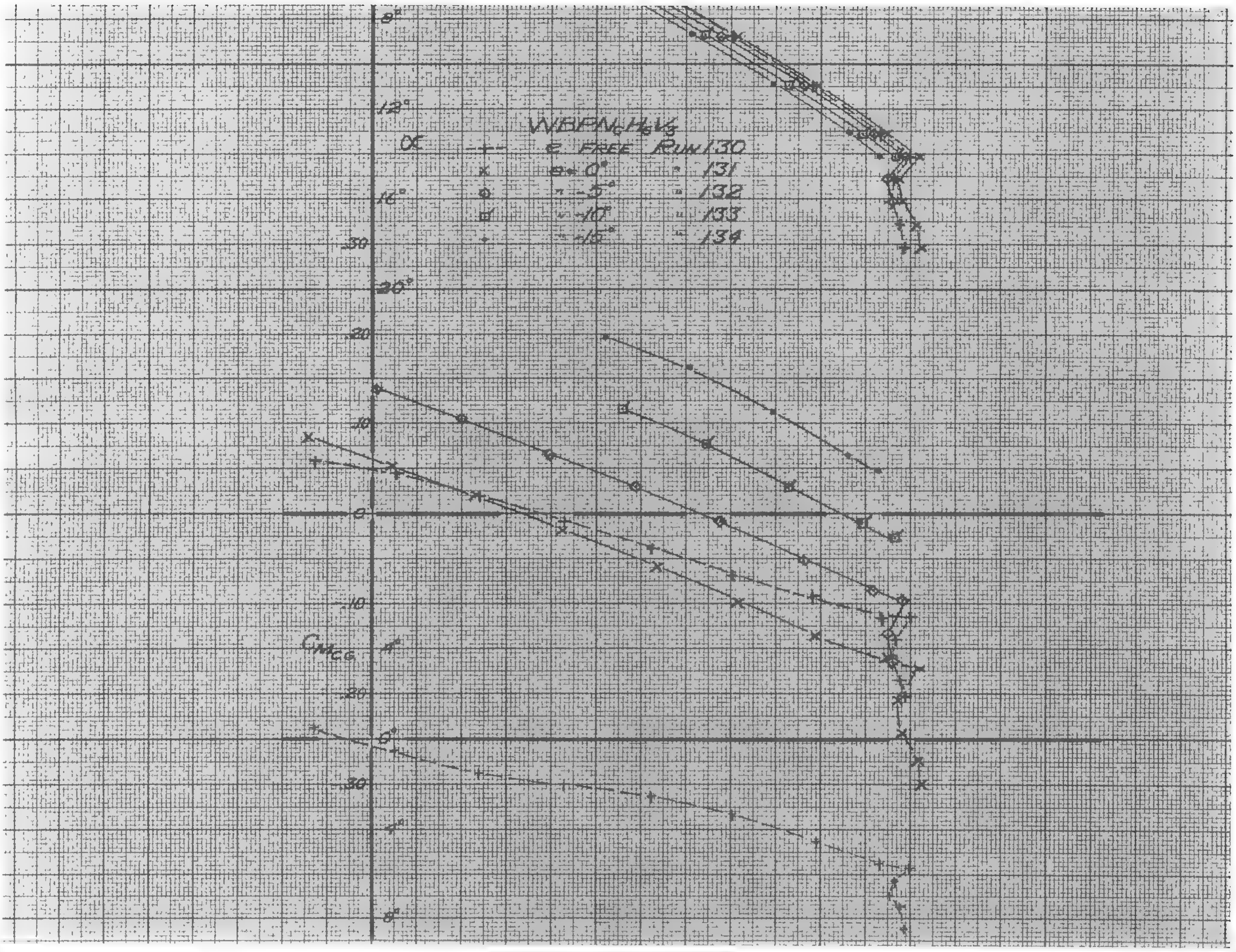

WBFN4H4V3
α
+ ε FREE RUN 130
× ε = 0° " 131
◎ " -5° " 132
□ " -10° " 133
• " -15° " 134
$C_{M_{CG}}$
8°
12°
16°
20°
4°
0°
4°
8°
.30
.20
.10
0
-.10
-.20
-.30

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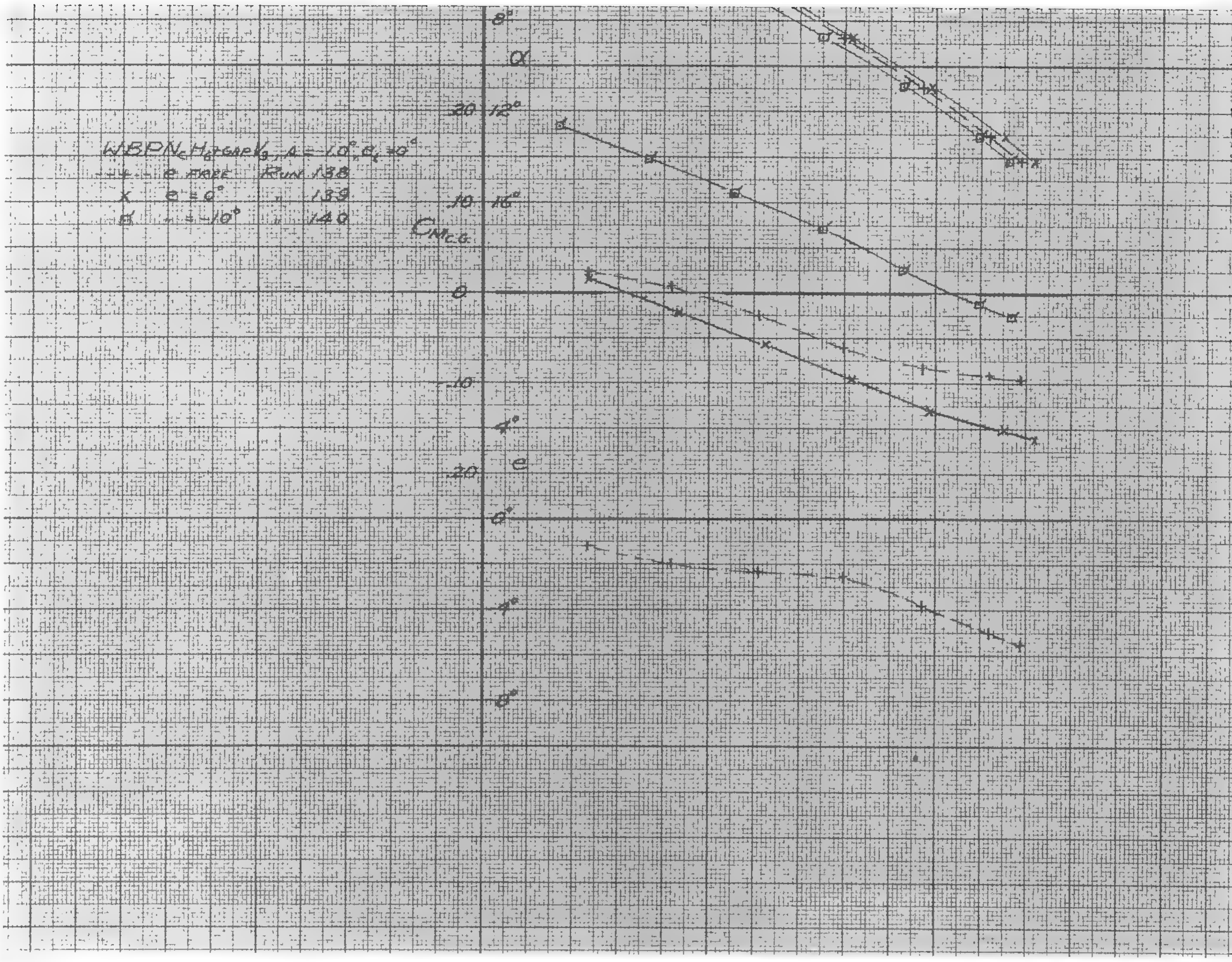
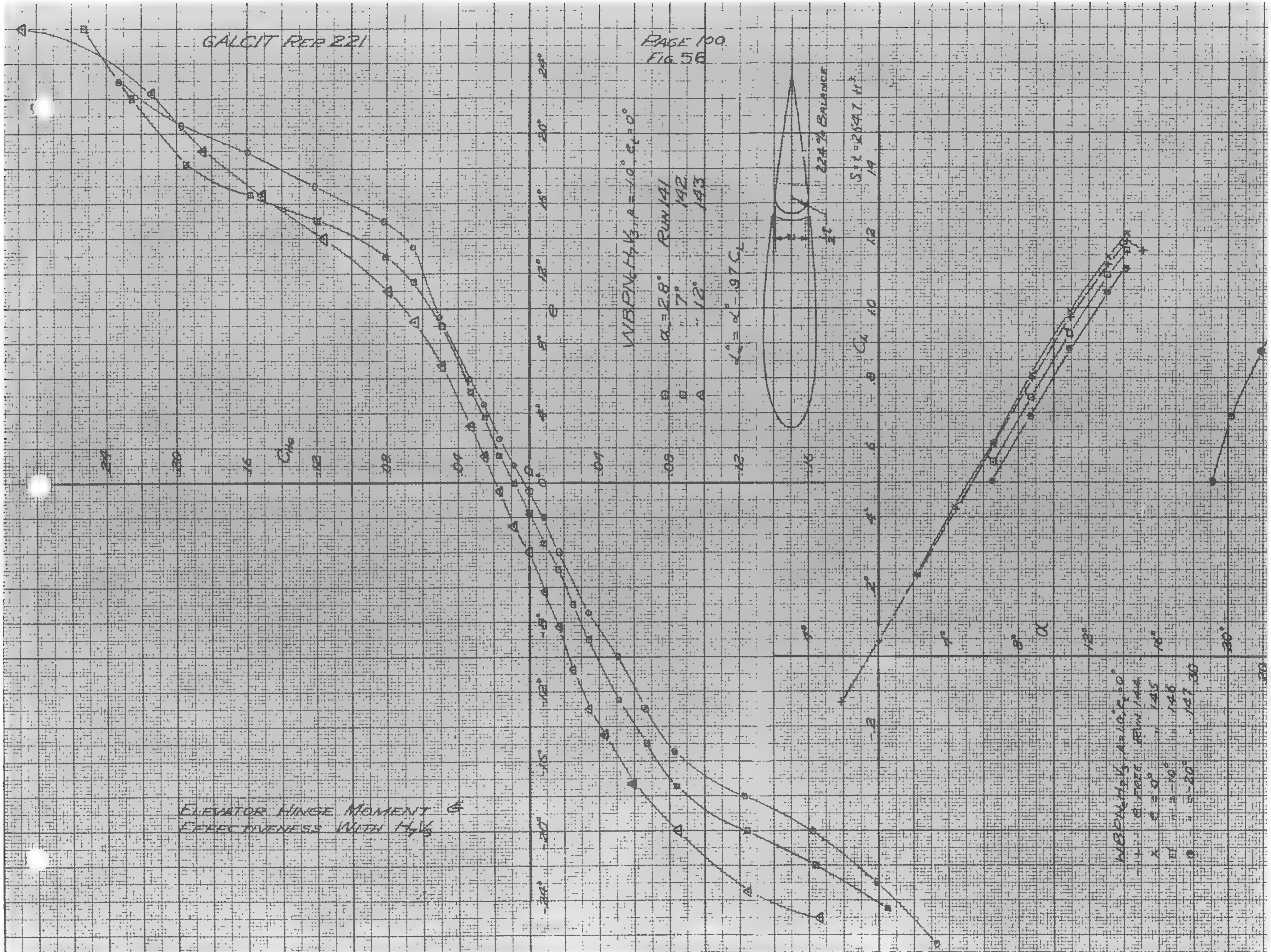
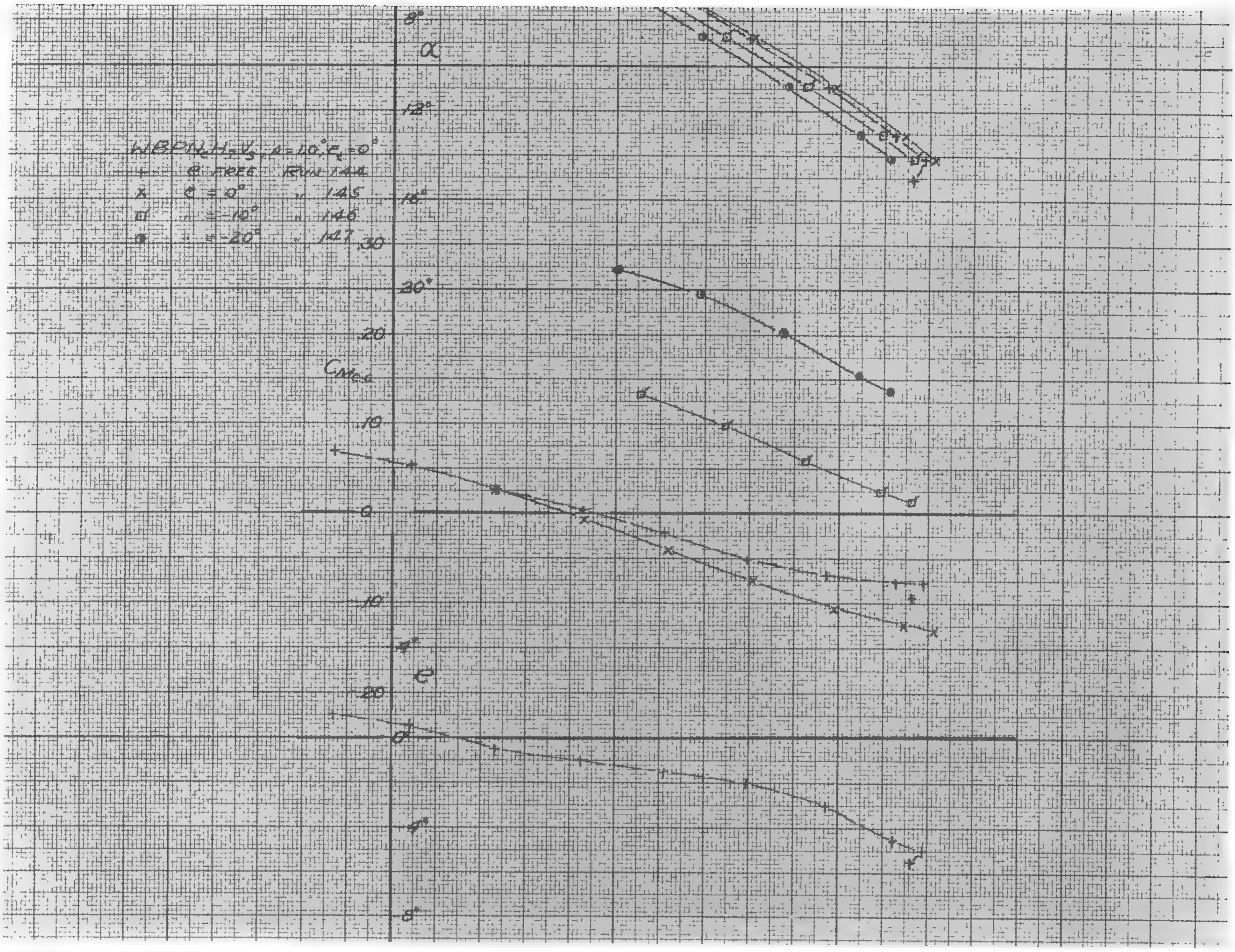
FIG. 55

Elevator Hinge Moment &
Effectiveness With H_e V_2 With
Elevator Gap Open


WBPN$_c$H$_6$+GAP V$_3$, A = 1.0°, e$_t$ = 0°
+ e FREE RUN 138
X e = 0° " 139
☐ " = -10° " 140
$C_{M_{C.G.}}$
20
10
0
-10
-20
α
8°
12°
16°
e
4°
0°
-4°
-8°



Elevator Hinge Moment & Effectiveness With H_4V_5



WBPNcH2V3, Λ=10°, F_t=0°
+ e FREE Run 144
x e = 0° " 145
□ " = -10° " 146
● " = -20° " 147
α
8°
12°
16°
20°
C_Mc.g.
30
20
10
0
10
20
e
0°
4°
8°

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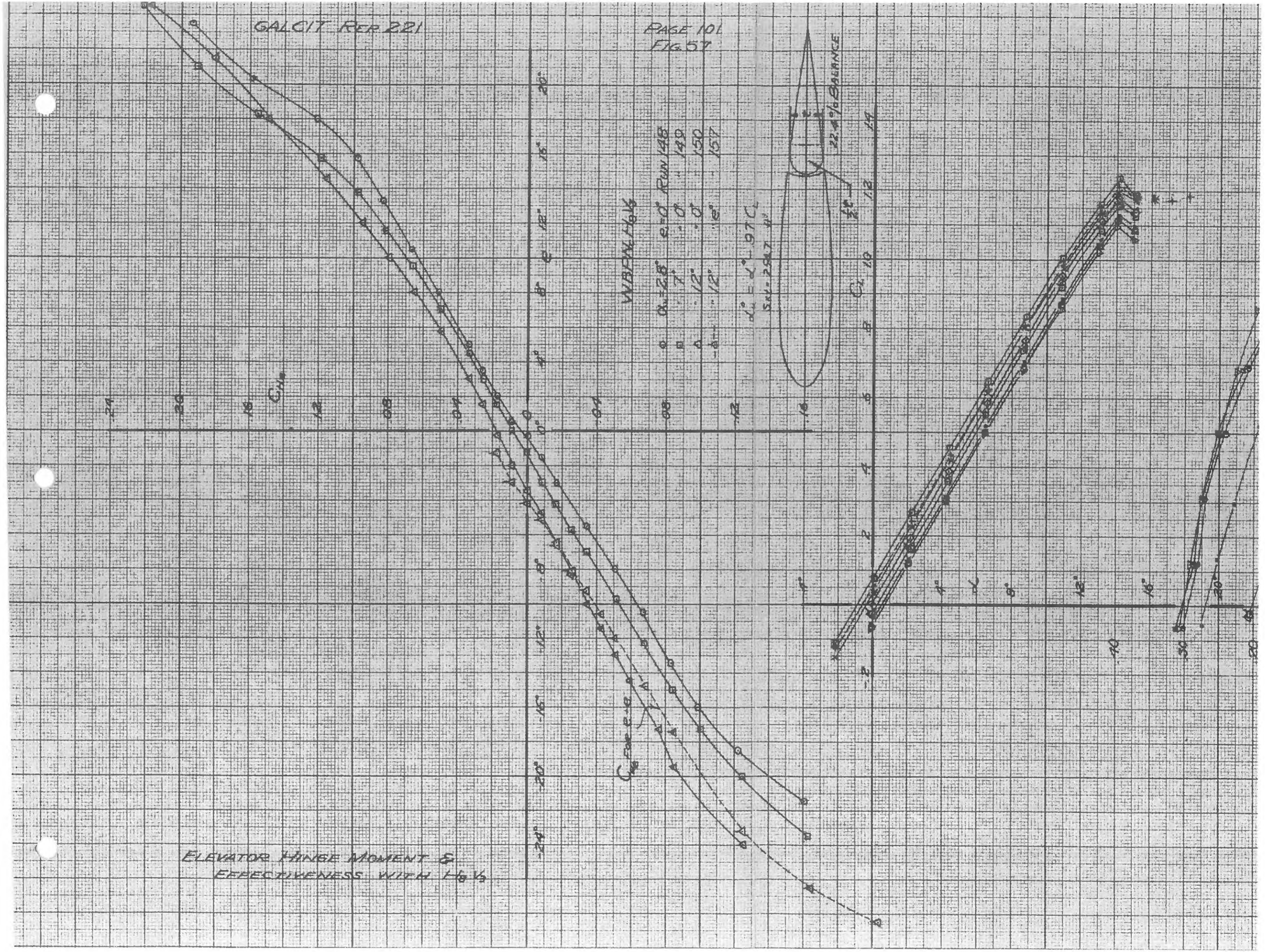
FIG. 57



ELEVATOR HINGE MOMENT &
EFFECTIVENESS WITH Hb½

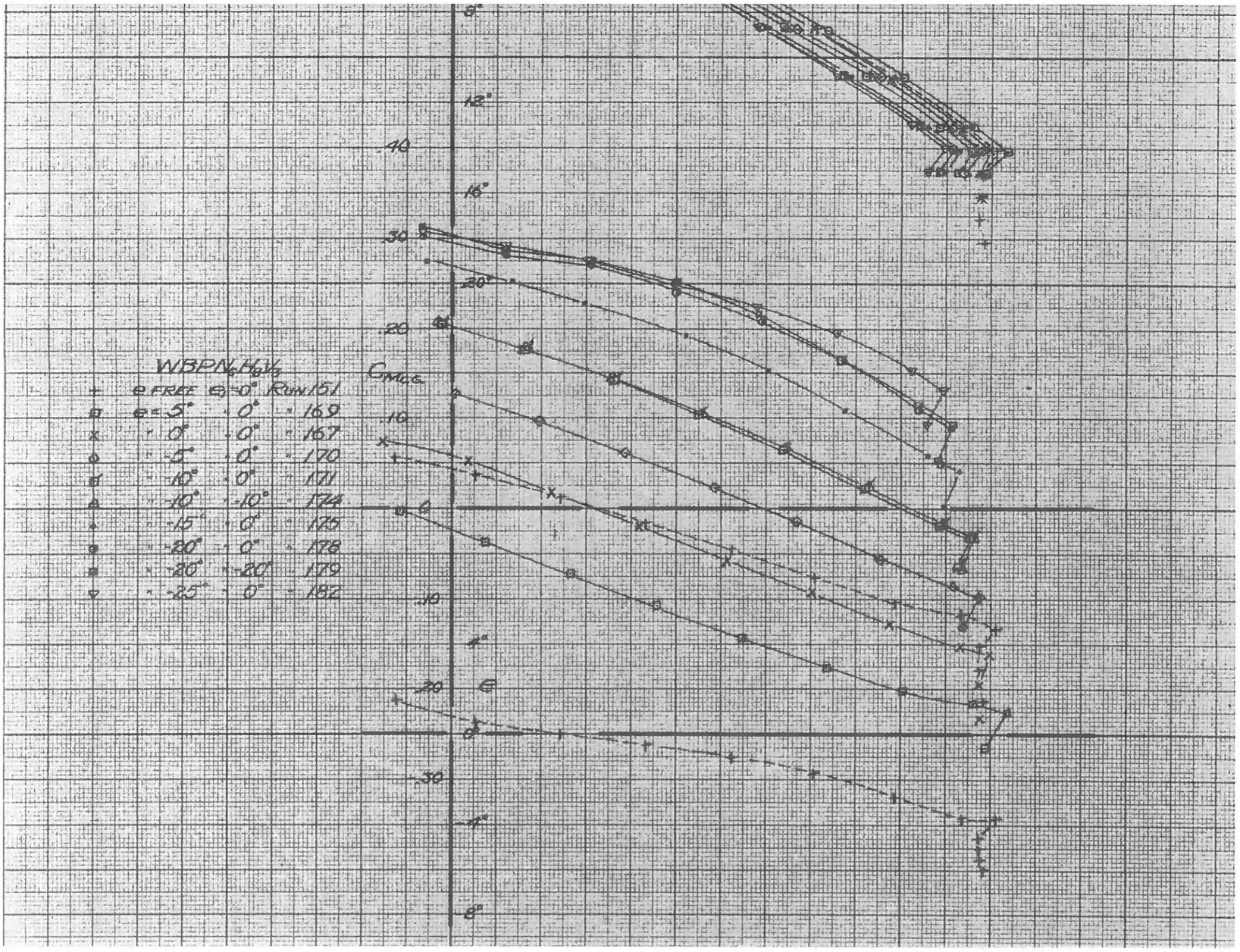

WBPN6H6V6
+ e FREE ϵj=0° Run 151
□ e=5° 0° 169
x 0° 0° 167
○ -5° 0° 170
-10° 0° 171
Δ -10° -10° 174
* -15° 0° 175
◎ -20° 0° 178
■ -20° -20° 179
▽ -25° 0° 182
CMAC
12°
40
16°
30
20°
20
10
4°
20
0°
30
-4°
-8°

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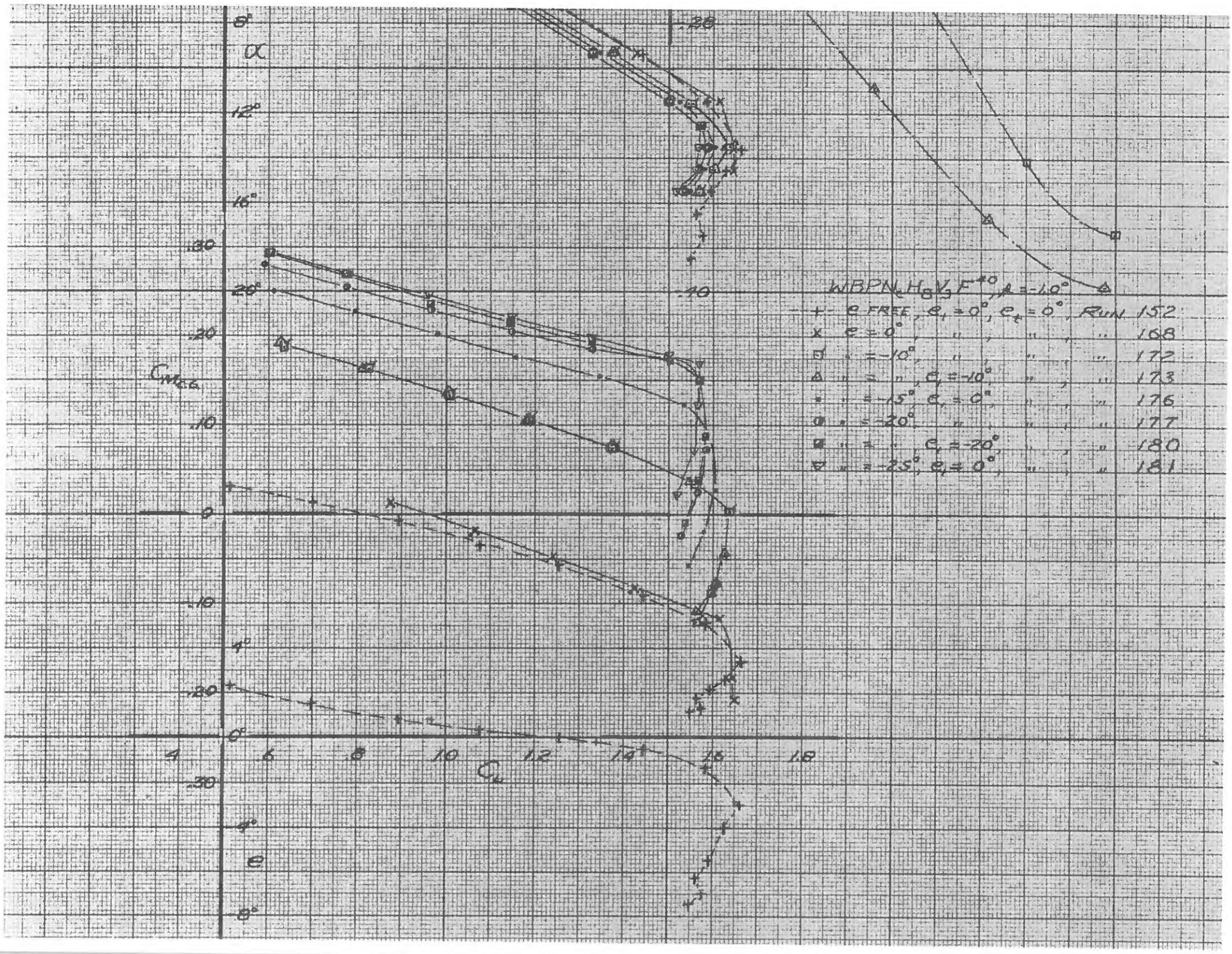
FIG. 58

Elevator Hinge Moment & Effectiveness with Hg's, Flaps Down


WBPN$_2$H$_8$V$_3$F^{+0}, i_t = -1.0°
+ e FREE, e_1 = 0°, e_t = 0°, RUN 152
× e = 0° " " " " 168
□ " = -10° " " " " 172
△ " = " e_t = -10° " " " 173
• " = -15° e_t = 0° " " " 176
◎ " = -20° " " " " 177
▣ " = " e_t = -20° " " " 180
▽ " = -25° e_t = 0° " " " 181
α
e
$C_{M_{c.g.}}$
C_L